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EDITORIAL NOTES.

Business Principles, Good and Bad, Illustrated.

CASTING the mind over the speech delivered by Mr. Charles Carpenter, D.Sc., at the meeting of the South Metropolitan Gas Company last Wednesday, it strikes us as being composed of several apt illustrations of good and bad business methods. The principles that should guide in business are few and of a simple order; but these principles are all too frequently roundly abused day by day, and hour by hour. Fundamentally, business should be conducted with an eye to fairness obtaining between all parties concerned. If there are any special circumstances that deserve to be taken into account, they should not be ignored; there should be an active exercise of prudence and foresight; and there certainly should not be any undue preference shown (where there are no exceptional circumstances) by those in authority above trading enterprise to one commercial industry competing with another. This statement does not pretend to be the complete code of basic business principles; but the principles cited are amply sufficient to serve our present purpose. If the Chairman of the South Metropolitan Gas Company had wittingly set himself to illustrate the practice and abuse of certain of them, he could not have made a better selection than he did in his speech.

The war has brought the country into extraordinarily abnormal conditions; and these conditions ought, by each one engaged in business, to be carefully weighed in connection with quite normal transactions. In some quarters, there was a tendency at the beginning of the war to make things more irksome than the occasion warranted for the poorer sections of the community, by taking advantage of the opportunity provided by the excuse of war to unduly enhance prices for necessaries. There was no obedience in this action to the economic law of supply and demand; but there was application to the situation of the strength that collusion and cohesion can impart under favourable circumstances. The Government stepped in, and named the maximum prices that should be charged for necessaries. It was a very proper proceeding, so as to defeat the machinations of the profit-grabbing traders. The Government then very rightly realized their duty in ensuring, until matters settled down somewhat, that only fair, and not exorbitant, prices should prevail. But when London is almost famished for coal, when the public services are in grave jeopardy through the non-delivery of customary supplies, and the Government themselves, with a view to helping to relieve the situation, enter into the business of letting-out on hire interned ships, they set the very bad example of demanding and commanding the inflated freightages that have lately been and are now ruling—thus rendering support to the shipowners in their fleecing exactions. The moderation the Government expect from traders in food, they should surely apply to themselves, but do not do so in connection with the chartering of these interned ships.

The London and Southern gas companies have a peculiarly strong case against this action of the Government; and they are not grumbling without a cause. Those who think their plea for special consideration has not sufficient foundation, have only to read Mr. Carpenter's address to appreciate that they are labouring under an error only excusable by want of knowledge of the actual facts. Consider that 80 to 90 per cent. of the ships that the South Metropolitan Company chartered for the bringing of coal to London have been taken by the Admiralty for feeding the Fleet; consider, too, that these boats are specially designed for rapid, and therefore economical, loading and unloading. No complaint is made regarding the action of the Admiralty. National needs must in this war take precedence of sectional needs. But when, to fill the void created by ship commandeering, interned boats—not specially constructed for rapid coal reception and discharge, and therefore uneconomical—are offered at such a price as 13s. 6d. and 14s. per ton, as against the prior contract rate of only 3s. existing for the requisitioned boats (while 5s. would be quite fair, with the additional costs incurred), the gas companies have a distinct right to complain, and a right to some expectation of redress. It is only a matter of common fairness; and it should be so considered independently of all question as to the correctness or otherwise of market rates, and the application of that useful screen to pernicious trading practices in regard to prices—the law of supply and demand. The gas companies have not, as Mr. Carpenter said, taken advantage of the country's need to exact the utmost farthing out of their helpless consumers. They have treated the public, as public companies should do, and as the Government expect such companies to do. Is that right, or is it wrong, under the special circumstances? There is only one answer. It is the right line. But what example are the Government showing? If there is no relaxation of their demand for the utmost penny of that which has been set up by the shipowners, grasping the opportunity created by the war, as the market rate for coal transport (and the references to the matter in the House last week do not indicate there is to be any), it means the equivalent of about 9d. or 10d. to the price of gas made from coal transported, at current "market" rates, from the Tyne to London. The principle of a fair price in this matter has not so far weighed with the Government. We trust, however, that wiser counsels will prevail. As against this bad example of business conduct is the good one set by the Company in regard to the tar products so urgently required by the Government to maintain the supply of munitions of war. In spite of all temptations to join in combinations, to make the country pay heavily for its pressing requirements, the Company have refused, and are in this matter, as in others, following the principle of only asking a fair price. The Government are thus the debtors of the gas companies; but, in regard to freightage for coal supply, there is no present sign of a reciprocal attitude on the part of the former. It is hoped that the Government will speedily show they intend, in connection with the provision of ships, to set a good example to the shipping community and to traders generally.

There we have illustration of right and wrong in regard to two salient business principles—fairness between all the parties concerned, and proper consideration of special circumstances. Another quoted by us is that there should be an active exercise of prudence and foresight. "It's an ill-wind "that blows nobody good." The war is something more than an "ill-wind;" and we would rather have seen large industrial and trade developments in this country made in times of peace as a result of enterprise than have had them the direct or indirect product of war. Last spring, before war was ever dreamed of by the nation, the South Metropolitan Company were devoting research, in connection with their tar-distillation works, to increasing the yield of products from tar. They little knew how soon what they were then doing in pursuit of commercial development would be an imperative necessity. So it has become. Some of the extra products upon which they were working had previously small value; to-day, they are absolutely essential to the life of the nation. There was preparation in providing them; and they are being sold to the Government at a fair price. Beyond this, a question asked by a proprietor at the meeting elicited the information that the Company, when the war broke out, went into the question of developing their tar-distillation system with the view of producing the intermediate products required by the manufacturers of aniline dyes; and to-day they have a working agreement under which they are to make a certain number of these products in specified quantity and of a specified quality. With this manufacture, the Company are well advanced. There is confirmation in the Chairman's remarks on this subject of what was said in the "JOURNAL" last week, that it is impracticable for gas undertakings to think of proceeding in the manufacture of dyes beyond the

stage of the provision of the intermediate products. It is altogether outside their province. The production of synthetic dyes is a highly technical and complicated matter; and one proper for an entirely distinct industry. In addition to this, it would be impossible for gas undertakings to commercially handle these dyes, which require the work of agents all over the world. It is a very big business. Gas undertakings practising tar distilling, or who intend doing so, have a sufficient additional outlet for enterprise in extending this branch to the provision of the intermediate products requisite to the aniline dye industry.

The third principle illustrated is that there should not be undue preference shown by the Legislature to one commercial industry under municipal control to the disadvantage of another under the control of private enterprise. But this is being done in every parliamentary session. The principle has been laid down by Parliament that, in dealings in gas and electricity, undue preference shall not be shown by the purveyors to consumers in respect of corresponding supplies. Mr. Carpenter incidentally alluded with gratification to the fact that the Court of Appeal has corrected the careless misinterpretation that has hitherto been made by electricity suppliers of this "undue preference" stipulation, and so have enabled gas companies to carry on their business freed from the unfair competition to which they had been put in this one particular. But there is another particular in which unfairness exists. Parliament long since enacted that, where such a public service as water supply was conducted by a municipality, in the event of there being any financial deficit on the working, there should be recourse to the rates to make up the necessary sum. Water supply, however, stands on a totally different basis from other trading services in which municipal authorities have been allowed to indulge. The times have changed, and so have the conditions of some forms of municipal trading. But though this is so, parliamentary enactment has not changed to make it fit the new conditions. Gas and electricity, Mr. Carpenter pointed out, have no monopoly of utility. They are, where one is company supplied and the other is municipally supplied, brought into direct and active competition. But while Parliament says that the suppliers must not show undue preference as between one consumer and another, Parliament has shown an undue preference—not deliberately perhaps, but owing to custom—to municipal electricity supply, by allowing it to be conducted (with the few exceptions where the Bermondsey, the Northumberland, or the Winchester clause applies) in any way, either rational or otherwise, that best pleases the local authority, with full permission to fall back upon the rates if their management does not produce sufficient revenue. Seeing that the condition of deficiency may be, and must be, the product of inadequate prices, the liberty given to have recourse to the rates to meet deficits is an undue advantage on the side of the municipal trading authority, and a disadvantage to the competing private enterprise. This is a matter that the London Gas Companies are going, and very properly, to raise in connection with the huge schemes of electricity supply designed for London and an extensive environment, if (the County Council one has been dropped for the coming session, but not the Company one) they are ever able to be brought before Parliament for consideration. The Gas Companies want a fair field and no favour for either competitor. Given this—insisting that municipal electricity supply should be conducted on fair commercial and competitive principles without any rate-backing to maladministration—private enterprise would be absolutely content. All such trading concerns, as Mr. Carpenter says in his instructive address, ought, whether municipally or privately controlled, to work out their own destinies unaided by the rates. Such a massive scheme of speculation in trading in electricity as the London County Council proposed has never been put forward before in this country; and, in connection with it, if ever authorized, Parliament should say that it must be conducted in such a manner as to be positively self-supporting. There will be strong electrical objection to this; but there is confidence in saying there will not be a sane argument advanced from any electrical quarter as to why municipal electric trading should have any undue preference over private gas trading.

The Higher Efficiency Movement.

Almost imperceptibly, but the evidence as to the fact is available on investigation, there has been opened up, and is growing, a new movement for making measured efficiency one of the chief qualities in purchasing gas-using appliances. It is a very excellent movement; and we hope to see it, in buying such goods, completely displace the old practice of making price the superior consideration, and of constantly endeavouring to push back price a little, and, if successful, congratulating oneself upon having been sharp enough to derive an additional "economy" to place to the credit of the undertaking. This sort of thing, pressed too far, is a mistake, and can only have one result. Quality and efficiency must be the sufferers; for the best of makers are only in the position to supply a certain value for a given price. Custom existing for the cheap class of goods also tempts into the field makers of rubbish, which, getting into the hands of retailers, is distinctly prejudicial to the interests of the gas-supply industry. That which in any way prejudices is something that should be exterminated; and we should like to see every practice rooted-up that encourages the putting upon the market of cheap and nasty types of gas-consuming goods. Of course, fairness in price is a matter that affects both parties. But competition between makers for high-efficiency goods should keep prices at a reasonable level. If it does not, then it is for the buyers to see what can be done to realize such a level. The main thing, however, is for the gas industry to work for the ridding of the market, as far as consumers will allow, of inefficient appliances, by making high efficiency one of the essential qualities, and ensuring it by measurement, when effecting purchases. This has been a practice in some undertakings for quite a considerable time; and in the showrooms of these concerns, nothing shoddy is to be found, and all the appliances on view will, under proper treatment, render a high efficiency. But this is not the case in all undertakings. There are some, and they form a large proportion, in which cost, and appearance in relation to cost, are about the only factors that are regarded in making purchases.

There is now, however, as we have said, quite an appreciable tendency in the direction of purchasing on measured efficiency, and not accepting the *ipse dixit* of the manufacturer, however reputable, as to the capabilities of his goods. The purchasing, with tested efficiency as a factor in qualitative merit, means that every gas undertaking must equip itself with the necessary apparatus for testing, and so must every manufacturer. We remember that some time ago an American critic twitted us over the fact that the nominal candle-power distinctions given by British lamp makers to their productions appeared to be readily accepted as absolute truth by gas undertakings, without any attempt to verify the statements by actual testing, with the result that, when similar lamps were independently tested, it was somewhat frequently found that there was a gulf that required bridging between actual and reputed performance. If there is no check upon the averments of manufacturers in this regard, there is a natural inclination to err a little on the wrong side rather than on the right side. As a matter of fact, there are lamp manufacturers who have no means of making photometrical tests, other than by submitting their goods to an outside photometrist; there are others who have properly equipped test-rooms. We sometimes fear that the duty accorded to their lamps by the former is often the result of guesswork, and not the product of actual testings; while in the case of the latter makers, their results are, as a rule, reproducible or capable of confirmation, given similar conditions. But even these makers fail in supplying adequate information as to the conditions of the testing. To be sure that any differences between the efficiency tests of gas undertakings and their own candle-power tests may be open to explanation, the makers ought really to supply an analysis and the calorific power of the gas on and by which the ascribed results were obtained. The one is not of much value without the other for a purpose of this kind, seeing that the calorific power in both cases may approximate, but in the one case it may be the calorific power of a gas containing a fairly large percentage of carburetted water gas, while in the other it may be the calorific power of a straight coal gas. This may make a considerable difference to the resulting candle power of the lamp under test. At the present time, during the ugly and increasing stringency in regard to coal deliveries, and the extraordinary cost of freights, water-gas percentages have in places largely increased; and, under such conditions, without an analysis of the gas by which the ascribed candle-power capacity of the lamp was secured, a difference between this candle power and the testing at a prospective purchaser's works with a different grade gas might expose the lamp to the injury of rejection. These remarks apply to practically all forms of gas-using appliances. To thoroughly

explore efficiency, and see that makers' assertions are confirmed under local conditions, comparative information must be available as to gas composition and calorific value.

One drawback to the carrying-out of efficiency tests on gas-consuming appliances at gas-works has been the lack of really suitable equipment. For comparative testing at various angles of high-candle power lamps, the photometrical apparatus is of rather an expensive order; and, probably except the largest gas undertakings, those concerns that have been in the habit of investigating the efficiency of high-power units have had to improvise something for the purpose—as has been done at Bradford by Mr. J. W. Roper [see *ante*, p. 143]. We have not the slightest doubt that the technical staffs of many other gas undertakings will copy this equipment for making testings which, if not positively accurate, will be approximately so, and at any rate will enable comparative readings to be made, as well as candle powers furnished by makers to be authenticated with sufficient closeness. We should like to hear from other sources as to forms of equipment of a not too costly order that could be recommended for efficiency testings such as are in view. The same with the testing of other apparatus—gas-fires in particular. A moderate priced equipment, and a method that is not too time-absorbing, for testing the radiant efficiency of gas-fires have been badly needed. A few gas-works with large laboratories have the Leeds test in use. By this same means, some of the makers keep watch and ward over their gas-fire productions. But the Leeds test is not one that meets the requirements of the majority of gas-works, which want a reliable and fairly quick means of testing the relative efficiency of the fires for which their custom is desired. Several gas-works (apart from those properly equipped with appliances) have rough-and-ready methods of putting sample fires to the proof on the score of efficiency. But this is not all that is required; and we were glad to be in a position to give some information last week as to the prospect of the early availability of a reliable and quickly applied test, and one that will be not expensive [pp. 303, 316]. Testing for hygienic efficiency can be carried out either by the "Shadow-graph" method or else the still handier "Lancet" tetrachloride test. With water-heating appliances, a gas-meter, water-measure, and thermometers will tell the tale of efficiency; and, in other directions, there are fairly simple methods of ascertaining capacity.

Of this we are convinced, that the palpable movement for testing efficiencies of gas-using appliances, and of purchasing on result, is one that is going to grow, and is going to penetrate down from the large to even many of the small gas undertakings. The practice is protective of the interests of the gas industry; and with the strong competition to which the industry is exposed—competition which is bound to become more and more acute with time—high efficiency gas-consuming appliances are the ones that supply the best of all possible defences against the endeavours of competitors to win fresh ground from the industry. The gas supply may be never so good for use in the modern and good types of appliances, but if the appliances themselves are not capable of utilizing the gas to the best advantage, the work of the gas maker in furnishing gas of really fit character is completely neutralized. Although a gas undertaking may only buy high-efficiency goods on its own testings, there is still the danger of the retailers in the town supplying goods of an indifferent order. In some places in America, there is co-operation between the local electricity suppliers and the retailers of electrical fittings. The former test appliances, and send information as to the results to the local retailers; and so they know what is worthy of acceptance and what should be banned. We believe in some instances users are also advised as to what may be bought and what should be passed by, if they desire to get the greatest value out of their expenditure for gas. Systematic work in this direction of furthering the use of high-efficiency appliances must tell—upon the fortune of gas undertakings, upon the contentment of consumers, upon the work of the manufacturers in maintaining high standards, and upon the efforts of the electrical competitor to supplant by electricity larger and larger parts of the gas business.

Freightages and Works Off the Coast and River.

On any large question such as that of coal freightages to London and the South, it is impossible to concentrate the whole bearings until one is brought into contact with the diverse circumstances of all those in any way affected. Consideration of the remarks on the subject made by Mr. Charles Hunt, in his address to the proprietors of the South Suburban Company last Friday, suggests an aspect of the matter of which sight should not be lost. It is that gas companies whose works are not situated on the Thames banks are in a different position from the Metropolitan Companies whose works are on the river, in that the inland companies have no remedy to which they can, of their own volition, have recourse. They are tied to, and are entirely dependent upon, the cost of freightage ruling for the time being, and for the reason that they are unable to own vessels. To do this is, where practicable and the size of the undertaking permits, obviously a proper course to take at the present time. The Gas Light and Coke Company have steamers of their own, some of which were commandeered on the opening of war; but the Governor, at the recent meeting of the proprietors, mentioned that the Directors were purchasing three more vessels, and had put a new one on order. The Commercial Gas Company have their own steamers, sufficient for normal times, but insufficient to the extent of about one-fifth of their supply through the delay caused by the restrictions imposed by the Admiralty, which restrictions are unquestioned as being right and proper. This Company, we believe, are also making themselves secure in the matter of further carrying provision, rather than be subject to the impositions and the vagaries (for which there is no adequate reason) of "market" freights. The Wandsworth Company again have their own boats, which pay them well. The remedy of ship purchase is, of course, open to other companies of sufficient size with works on the river bank. At the same time, if freightages were at a reasonable figure, there would be no need to take this course, though such a line of action must all tend to the lowering of freights through the reduced demand for other ships.

However, what concerns those companies who are dependent on seaborne coal which has to be carried from the river to works by rail (making the expenses much heavier than those of the London Companies) and who are not in a position to buy and run ships, is to have some permanent easement of freightage, and not only to have the present freightage lowered by interned steamers being let at a lower rate than that which shipowners (with a fine sense for descriptive truth) speak of as the "market rate." A few interned steamers at a price per ton lower than market rate would be next to useless in producing a permanent reduction such as the inland gas companies want to witness. The only way in which permanence can be secured is by the Government providing sufficient tonnage through interned steamers to keep freightages moderate (in the circumstances of present times) and steady. The matter is of immense importance to these companies in view of coming contracts. It is obvious that, unless freightages are brought down and kept down by the Government, through a sufficiency of tonnage, or alternatively maximum and properly calculated freightages are fixed, a contractor for gas coal who secured one or more of a few interned steamers at a price below what is called the market rate, would have an immense advantage over other contractors in connection with coming coal tendering. Before the time arrives, it is hoped the freightage question will have settled down on a reasonable basis; but this will only be through an adequacy of tonnage provided by ships suitable for the coastwise trade.

Washing Gas for Toluol Extraction.

Greater prominence than they have yet received should be given to the remarks made by Mr. Macintosh Williams, at the Manchester coal conference the week before last, on the subject of the War Office and the supply of toluol. The War Office want all the toluol that is available in the country for the production of trinitrotoluol; and town gas is a potential source of this, at the present time, particularly useful substance. It is necessary for all coal carbonizers whose operations are on a sufficient scale to do their part in furnishing the necessary supply. For the time being, however, it is only proposed to ask gas-works carbonizing (say) not less than 60,000 tons of coal per annum to help in the matter by washing their gas. Of course, the quantity of toluol that can be derived from gas varies with the coal and methods of carbonization. But when it is stated that there are from twenty to forty times as much toluene in the gas produced from a ton of coal as there is in the tar made from the same quantity of coal, readily seen will be the important place occupied by the gas industry in this matter, and in the provision of a valuable necessary to the conduct of the war. This will be further accentuated by the state-

ment that, generally speaking, 2 lbs. of pure toluene, making 4 lbs. of trinitrotoluene, are recoverable from 10,000 cubic feet of coal gas. Seeing that in this country between 16 and 17 million tons of coal are carbonized annually for town-gas purposes, there is the source of a good many million pounds of toluene, and consequently approximately double the quantity of trinitrotoluene—that is to say, if it were necessary to bring all the gas under tribute, in addition to the other sources of supply provided by the tar distilling industry and coke-ovens.

It is a pity the War Office did not set to work earlier to tap the source of supply provided by town gas. They are in great hurry now for the material; and if they had only moved some time ago, the plant might have been erected, the recovery proceeding apace, and large supplies available, ere this. Mr. Macintosh Williams mentioned that a simple plant has been designed by Dr. W. B. Davidson for washing gas for removing the toluol, and that the Government are prepared to supply the necessary plant to gas undertakings, and pay all expenses incurred in the extracting work, together with a percentage of profit, on the lines named in his remarks [see *ante*, p. 309]. The plant designed by Dr. Davidson is described and illustrated in other columns to-day; and this plant, experience has proved, is quick and certain in washing out of the gas the compound wanted. There is an opportunity here for the managements of the larger gas undertakings without any financial detriment, but rather some slight gain, to show their patriotism. Only one question need be asked in regard to the matter, and it is as to the effect upon the gas. If the illuminating power or calorific value of the gas requires it, the wash-oil used can be pre-benzolized, so that in extracting the toluol the benzol contents of the gas will be practically unaffected. There have been confirming experiments at Birmingham, where plant on an ordinary working scale, we believe, is now doing constant duty for the country. The result of the experiments show that, if the wash-oil is pre-benzolized to the extent of 5 per cent., it is possible to extract nearly 80 per cent. of the toluol contents of the gas, and yet leave in upwards of two-thirds of the benzol contents of the gas. This is very satisfactory indeed. The quicker the work is developed, the quicker the War Office Committee on the Supply of High Explosives will be relieved from anxiety as to the sufficiency of the supply for the future. It is a case where over-production is better than under-production.

What Now of the Residuals Restrictions?

We are not disposed to chuckle over the position in which, by the irony of circumstances, the war has placed the meddlers with the freedom of the gas industry in the matter of dealings in, and working-up of, the residual products of gas manufacture. But to-day the mind goes back to 1912, to the tussle with the chemical makers; and to the sane decision of the Joint Committee who considered the questions involved, and which decision condemned the shortsightedness that had deprived certain gas undertakings of their rights to liberty of trade in residual products. We remember, too, the admissions made as to the operations, behind the Joint Committee's recommendations, in order to get, as one Counsel for the chemical manufacturers said, the model clauses altered so as to put an end to all dealings in, and working-up of, residual products by gas undertakings, other than the products of their own making. Those responsible for the model clauses, and who—ignoring Joint Committee and practical issues, but listening cheerfully, willingly, and sympathetically to the chemical manufacturers—drafted clauses proposing to put restriction upon gas undertakings, may reflect to-day that, if certain tar-distilling and sulphuric-acid making gas-works had had the limitation placed upon them, the country would have been in a worse position than it is in the provision of those elements which the War Office are feverishly anxious to obtain for the supply of explosives. One firm, who had much to do with leading the opposition against the gas industry, are engaged in the manufacture of sulphuric acid. Sulphuric acid, they well know, has been urgently required by the War Office. Certain gas undertakings with the plant for making this commodity have been working at high pressure to meet the requirements, and have been getting in spent oxide from other concerns to help them; their own production not having been sufficient. What about restriction under these national circumstances? If these concerns had been under restriction, and unable to purchase the spent oxide, the fault would have been on the heads of those who, knowing nothing about these things, favoured the people who wanted to shackle the gas industry—for whose benefit? That of the nation? No; for the benefit only of themselves. One gas undertaking has given up for War Office purposes the best quality of sulphuric acid for an inferior quality, in order that the military authorities may have what they require in the present emergency. Against time, too, certain undertakings with tar-distilling plants are working to secure the toluol that the Allies so urgently require for the production of trinitrotoluol. In all ways, the undertakings have patriotically complied with the call, and they have kept themselves free from unpatriotic combinations and understandings destined to make the country "pay through the nose" for its requirements. These are matters that should rather confound those who have played into the hands of the chemical manufacturers and others whose personal interests are considered superior to the liberty of the gas industry in dealing in, and utilizing to the best advantage, their secondary products. In the hour of the country's need, gas undertakings with tar-distilling and sulphuric acid plants have been valuable aids, and have not been found wanting.

Coal and Freights in the Commons.

No apology is needed for a somewhat frequent reference to this combined subject. It is one that is very much with us; and wherever we go, it is found to be *the* matter of the hour for the whole gas industry. The question formed part of the still unfinished debate in the House of Commons on the prices of necessaries. The Prime Minister handled well the facts and figures placed at his disposal by the departments concerned; but the facts and figures so far as they relate to coal supply and freightages from the Tyne to London are not new. We have made their acquaintance before, and are now quite intimate with them. One temporarily refreshing point was that the freightage for the interned ships had fallen to 10s. per ton, which is 4s. lower than the top price so far reached. But, deducting the approximate rate of 3s. existing before the war, the balance still meant between 7d. and 8d. per 1000 cubic feet of gas sold and produced from coal so carried. But what has now happened? The Prime Minister's speech was published on Friday; and the same morning the freightage was back to 13s. This looks as though the 10s. rate was specially prepared or arranged for the Prime Minister's use. However, it is hoped that fourteen more ships will be released this week; and, with an acceleration of the work of the Prize Courts, it is anticipated that still more will be shortly available. This action should automatically, through the operation of the law of supply and demand, lead to the further reduction of freightage. This is not the time for maxims—economic or otherwise, but facts; and one fact is that the freightage rate from the Tyne to London is out of all countenance with the increased charges and more stringent running conditions that now obtain, and that the shipowners are in strong enough position, with the Government at their rear, to continue to thickly line their pockets with gold.

Business-like Methods and Enormous Profits.

One direction in which the Government have failed has been in the lack of proper business methods in dealing with these ships. The Government seem to have been the easy tools of interested persons. Mr. Bonar Law, in the course of Thursday's debate, made some good and friendly thrusts, which, it is hoped, will get home, and have excellent effect. In this, as in some other matters, he holds that full and proper use has not been made during the war of one of the greatest assets of the country—the business organizations of business people. The Government methods of handling ships, commandeered and interned, during the war has caused great delay, much waste of time, and much loss of efficiency. What has the Government to say to the point which directly assails their action in supporting the shipowners in their extortionate rates? Mr. Bonar Law's idea is that, when dealing with these ships, it ought to have been kept in view that the object of the Government was not to make a profit. That is what the London and Southern gas industry has contended all through. But profit does seem to have been one tangible object, in addition to ministering to the relief of London. The profit that the Government have been making, and are still making, on these interned vessels is at the rate that the shipowners have been

placing in their pockets. This is what Mr. Bonar Law, who knows more about shipping than the Prime Minister, says about those profits: "I know a little about the profits of ships when they are well managed; and, in spite of the drawbacks which I have pointed out—the delays, and the much higher cost of running them—I have not the smallest doubt that well-managed ships to-day are making simply enormous profits, and that those profits come from the very cause for which the people of this country are making sacrifices in every direction, and even giving their lives." And the shipowners and the Government still pursue the heavy-profit policy!

Export Reductions and Effects.

The Board of Trade returns relating to our foreign trade during January show that the coal exports were lower by 2,319,373 tons (or 38 per cent.) than in January, 1914. This reduction for the month is not so great as in the preceding five months of the war—the average reduction of which months was 2,721,750 tons, or a total of 13,608,754 tons. With the 2,319,373 tons for January, the total reduction of coal exports since the war began amounts to 15,928,127 tons—quite a substantial quantity. In fact, it is about equal to the annual requirements of the home gas undertakings of the statutory class. In the debate in the House on Thursday, this reduction of the export business was touched upon. Mr. Asquith had been going over the oft-repeated tale as to the causes of "shortage" of supply from the pits—principally attributed to some 13·9 per cent. of the miners having joined the forces. Of the places of this 13·9 per cent., only some 3·4 per cent. have been filled, leaving the shortage of hands at about 10·5 per cent. No one perhaps knows more about the truth of the matter than Mr. Fenwick, one of the members of Parliament for Northumberland; and he says that the miners in his division are not working up to their full capacity, and are now earning less, solely through the reduction of the overseas trade. The coal which is now being retailed in London at something like 38s. a ton is purchased at the ports at 13s. 6d. The difference between these two figures indicates who are the sharers in the excessive profits. The men in Northumberland and Durham, Sir J. Walton (who is a coal owner in the former county) also says, are not working nearly full time, and there is no shortage of coal. He avers that, if the means of transport were sufficient, there is no reason why coal should not be delivered in London at 20s. per ton. It ought not to be difficult for the Government to see the weak place in the coal supply system for London under present circumstances, and take speedy measures to produce rectification—using as many ships as possible, and determining by estimate (and not by the shipowners' measure) what would be a fair tonnage price to charge for them.

A New Union.

The circumstances attending last Friday's meeting of the Brentford Gas Company were in several respects of a noteworthy character. Chiefly was this the case, perhaps, from the point of view that the gathering signalized the passing of an old condition of affairs, and the inauguration of a new. After having remained "single" for close upon a century, the Company has taken unto itself partners—those responsible for the administration of its affairs having evidently determined to test the truth of the old motto "Union is Strength," by the carrying through of an amalgamation scheme with the Staines and Egham District Gas Company and the Sunbury Gas Consumers' Company. The Chairman (Mr. R. J. Neville Neville, M.P.) put the matter aptly when he remarked that this was the last occasion on which the old "bachelor" Company would be meeting; and if, as he went on to declare, this old "bachelor" (who has certainly reached years of discretion) has now become united "in the strictest bonds of matrimony" with two other Companies, one may venture to express the hope that his career as a "bigamist"—for, as Mr. H. D. Ellis subsequently pointed out, if the facts are correctly stated, this is what the erstwhile "bachelor" must now be styled—may be even more successful than the long period passed in "single blessedness." The former "bachelor" has set himself a high standard to live up to; the position revealed by the present accounts being an eminently satisfactory one. But the excellent record of the past will merely serve to stimulate to still greater efforts in the future; and proprietors will await developments with full confidence.

To Serve the Country.

In connection with gas companies' reports and meetings now, it is customary to find a statement which shows to what a large extent those who are engaged in the service of gas undertakings are with the Colours actively assisting their country in its time of trial. At the meeting of the Brentford Gas Company, the information was conveyed to the proprietors in a manner more striking than a plain recital of the total number of men who have left their work with the Company for the purpose of joining His Majesty's Forces. A Roll of Honour which has been prepared for display in the offices of the Company was hung on the wall at the end of the meeting-room, so as to be in the line of vision of all present who were facing the Chairman. Under the simple heading, "Brentford Gas Company Roll of Honour," nearly 300 names are inscribed; and at the foot appear the words: "The Great War, 1914." This is not all. To five of the names some writing is attached, which on examination proves unhappily to be in four cases "Killed in action," and in the fifth "Died of wounds." Thus those who have gone from the works are doing their duty like men. Those left behind, too, are loyally shouldering the additional burden so imposed; while the Company, for their part, are doing for the absentees and their dependants what, the Chairman modestly remarked, "all good employers do."

Another Example.

While making free acknowledgment of the patriotic attitude adopted by both employers and employees in the gas industry with regard to the crisis in the nation's affairs, it is but fitting that note should be taken that in other directions and other respects the situation is being realized in a manner which does great credit to both masters and men. For one thing, there has been since the war began an almost total cessation of industrial disputes, not because nothing has been found to dispute about, but because it has been recognized that the claims of the country should come before the claims of the individual. The latest example of this excellent spirit occurred a few days ago, when the welcome announcement was made that a threatened dispute in the West Yorkshire coalfield had been settled, as there was a confident feeling that it would be, without the stage of open conflict being reached. In this case, after a conference lasting five hours, the coalowners agreed to concede the men's demands during the continuance of the war—"with the object of avoiding the disastrous consequences of a coal strike in a national crisis." What the owners have thus agreed to do is to pay to workmen paid by contract the minimum wages fixed by a second award made last July by Judge Amphlett, *plus* 15 per cent. of not less than two-thirds of the minimum wage fixed for such workmen by his original award of 1912. The explanation is a somewhat complicated one; but the main point is the simple and gratifying one that, so long as the war lasts, the owners will not let their own interests stand in the way of those of the country. Loyalty could ask no less.

London Electricity Schemes.

There is to be no attempt at reversing the London County Council vote which for the time being put an end to the progress of the Electricity Bill, if it did not quash it. The measure is simply to be formally withdrawn from consideration by Parliament this session; and in view of the mass of opposition, though much money has been spent on the scheme and its promotion to this stage, withdrawal is about the best thing that could happen to it. Parliament does not want at this particular time to be bothered with such a huge matter; and it is well known that, if it ever comes on, in addition to the elements of the scheme itself, large questions of principle are going to be raised in connection with it. The ten Companies' Bill is now in possession of the field; but we should think that this, too, will be withdrawn, as it is not likely that Parliament, having in effect already constituted the London County Council the prospective electricity authority for London within measurable time—1931—will allow this scheme to go through without the County Council having an opportunity to bring forward their alternative one. There is another indication of the rush that there has been on the part of the County Council to develop a scheme, and to get it through Parliament, in a piece of information given by Mr. Charles Hunt at the meeting of the South Suburban Gas Company last Friday. It was only in the session of 1914 that the latter secured power from Parliament to purchase and to develop their new site at

Belvedere, on the banks of the Thames. The Directors of the Company saw the advantages of the site for gas-manufacturing purposes. Since then the County Council have discovered its advantages for the purposes of their scheme, and so scheduled it in the now dead or suspended Bill—thus inviting Parliament to revoke their decision of 1914 which dedicated the land to gas-manufacturing purposes. But it is not at all likely that Parliament would give one session, and take away the next. The proposal is of a piece with the lines pursued by the Council in developing this scheme—lines that ignored the interests of all others save those of the Council. The unreasonable and covetous proposal would, of course, have been resisted by the Company, as the site is the one on which their future prosperity very largely depends.

THE GAS INDUSTRY AND THE WAR.

In view of the pressing requirements of agriculturists for nitrogenous manures, the Ministries of Agriculture, Public Works, and Commerce in Austria made an Order on the 18th ult., requiring all producers of sulphate and other nitrogenous manures, and all dealers holding stocks of same, to deliver only to such persons and in such quantities as the authorities should indicate. All contracts in these manures are made void. The procedure to be followed by agriculturists applying for supplies, and the terms of payment, are set forth in the Order, which is quoted in the "Zeitschrift des Vereines der Gas- und Wasserfachmänner in Oesterreich und Ungarn" of the 1st inst. Persons disobeying the Order, or obstructing its working, will be subject to a penalty of 5000 kronen [about £208] or six months' imprisonment.

An inconsistency was pointed out recently in the Commons by Mr. Fell, who inquired why the windows of the Houses of Parliament facing the river were allowed to be brilliantly lighted after dark, while the bridges and neighbouring streets were almost in darkness. It was admitted in reply that the blinds in some of the rooms were not sufficiently opaque; but the assurance was given that steps were being taken to remedy this.

The following statement taken from the "Birmingham Post," though it deals particularly with cycle-lamps, is worth reproducing here, as indicating the views held in some quarters on certain subjects: "The difficulty of lamp manufacturers is to obtain an adequate supply of lenses, which in the past have almost all been obtained from Germany and other Continental countries. Most of the manufacturers had large stocks in hand when the war broke out; but these are rapidly becoming exhausted, and in view of the apparent inability or reluctance of British glass-houses to supersede the foreign supply, there is much anxiety as to how they are to be replaced. Much against their own interests, lamp manufacturers have during the past week or two refused to purchase large consignments offered them 'from Holland,' either direct or through London merchants. In one case, the firm to whom a stock was offered wrote inquiring where the Dutch glass-house was located; they having never heard of one which turned out lens glasses. The reply was that to meet the extraordinary demand a new glass-house had been put down, and had already commenced production. To this, the lamp firm replied, 'We don't think,' and passed the documents on to the police authorities."

At sunset on Saturday, Liverpool came under lighting restrictions such as various towns (including London) have already long been familiar with. The Order issued by the General Officer Commanding the Mersey Fortress was in the following terms:—

> In all brightly-lighted streets, specially in the centre of the city, the lights must either be lowered or made invisible from above by shading them or by painting over the tops and upper portions of the globes.
>
> The use of illuminated sky-signs, illuminated fronts or lettering, illuminated clocks on prominent buildings, and powerful lights of all descriptions for outside advertising or for the illumination of shop-fronts, picture-dromes, &c., must until further orders be discontinued.
>
> All large lighted roof areas must be covered over, or the lighting reduced to a minimum.
>
> Powerful headlights on motor-cars are prohibited.

The Italian Premier and the Minister of Agriculture and Commerce have, reports the Special Correspondent of the "Daily Mail," been interviewed by a deputation from the owners of important gas-works, who referred to the disastrous condition of the industry. Attention was drawn to the fact that coal supplies are very short indeed; and various remedies were suggested. Apparently, however, it was recognized that the only efficacious action would be for the Government to take steps to deal with the enormous rise in freights. In this direction, the assurance was given that the Government would, if possible, make an effort to relieve the situation.

The Town Clerk of Southport has been authorized by the Lighting Committee to carry out any suggestions of the Military Authorities with reference to the lighting of the town. The tops and parts of the sides of all gas and electricity lamps in the borough have already been obscured, and the streets are in semi-darkness.

Mr. Fred. Johnson, the assistant to Mr. J. G. M'Geachin, the Manager of the Dumbarton Corporation Gas-Works, has left for Aldershot, having joined the Colours.

At a meeting of the Exeter City Council last Tuesday, attention was called to the precautions which had been taken by the Mayor in view of a possible attack by enemy aircraft. One of these safeguards was, in case of danger, to at once darken the city by turning off the gas at the works, and also the electric light. It was pointed out by some of the councillors that it would be a highly dangerous act to suddenly turn off the gas. This might in a public building cause panic; and there was the further and more serious danger still of suddenly turning it on afterwards. The Mayor explained that no gas would be turned on again without notice to the persons concerned; and that for this purpose the Gas Company were co-operating with the Council. With regard to the sudden withdrawal of light from public assemblies, he promised that inquiries should be made and every possible step taken to minimize the danger of alarm.

At a meeting of the Battersea Borough Council, Mr. J. J. Taylor asked for particulars regarding an item in the Finance Committee's report "Gas Light and Coke Company, gas £457 13s." Mr. Willis replied that the account was for gas supplied to the public lamps during the December quarter. The allowance for unlighted lamps was £133 17s. 6d. Mr. Taylor inquired if the Electricity Committee had made any such allowance. He also asked for information as to a proposed payment of £16 12s. 8d. to the Wandsworth, Wimbledon, and Epsom District Gas Company. Mr. Willis said that in this case there was a rebate of £9 16s. 9d. He was unable to give information regarding the electric street lighting. Mr. Brogan asked if either of the Gas Companies had in any year contributed £5000 to the Battersea rates. Mr. Raynor inquired whether any allowance had been made for the lamps found unlighted at Nine Elms before the war.

Very different opinions seem to be entertained as to what is meant by the instructions issued by the Military Authorities with reference to the screening and extinguishing of lights in South-Western towns. In some places, and those not the least conspicuous, the order has made little difference in practice. A few lights on the sea-front and a few others which are visible from the sea are extinguished; but otherwise the lighting of the streets goes on as usual. Neighbouring towns are meanwhile taking the matter very seriously, and are displaying little or no light in their streets, and screening those of the shops so effectively that there is scarcely a glimmer to be seen. The Bodmin Town Council are one of the authorities who were very seriously impressed by the order. They held a special meeting, and decided that none of the large lamps, and only half the ordinary lamps, should be lit, and that all the lamps should be extinguished at 8 o'clock. As a further measure of precaution, it was decided that the tops of street-lamps be darkened, and that shopkeepers be required to extinguish outside lamps at 8 o'clock each evening. Apparently this proved a little too drastic for the public taste, for there has since been a modification of the regulation. Lostwithiel, a neighbouring town, came to the conclusion that things might go on pretty much as usual, subject to the condition that all lights shall be extinguished in the event of an alarm being given. This the Mayor was to arrange with the Gas Company; and no doubt he has done so. In many of these small towns the need of lighting the streets late at night is never very seriously felt. Now that the public-houses close earlier, there are fewer people about than ever; and lamps are little needed. This, at all events, was the reason advanced at one West Country Town—Sidmouth—for extinguishing all the lamps one hour earlier than usual.

A suggestion was made by a member of the Leiston Urban District Council that the edge of the pavements should be white-washed, so as to enable pedestrians to see where they were going. It was decided that this should be done; and the Clerk was asked to interview the Manager of the Gas Company with a view of having the lamp-posts painted white up to a certain height.

A number of police summonses against Chelsea tradesmen, or their representatives, for failing to obey directions for extinguishing or obscuring lights, were heard at Westminster on Saturday last. In the case of Henry Byles, draper, of Fulham Road, the evidence was to the effect that the premises, comprising five double-fronted shops, were illuminated by sixteen electric lights, two being powerful arc lamps. Defendant had been warned before, and threatened to report the police officers for interference. He said he could not carry on his business if his shop windows were not lit up. The Magistrate imposed a penalty of £20 and costs. The defendant gave notice of appeal, whereupon the Magistrate pointed out that he might be fined £100.

It has been resolved by the Arbroath Town Council to insure the gas-works against war risks for £21,000.

PERSONAL.

Mr. E. H. Rapley, Manager and Secretary of the Brackley Gas Company, has been appointed Manager of the Malmesbury Gas Company, in succession to his uncle, Mr. Henry Ball, who died a few weeks since, at the age of sixty-two, after having held the position for more than thirty-two years—his appointment dating from Aug. 7, 1882. Mr. Ball's father went to Malmesbury many years ago from Chippenham.

OBITUARY.

The death occurred recently, at his residence at Wavertree, Liverpool, in his seventy-seventh year, of Mr. J. F. Robinson, V.D., Hon.-Colonel of the Royal Engineers (Territorial Force). Deceased was at one time connected with the Liverpool Gas Company; retiring from the treasurership at the close of 1910, after thirty-seven years' service. He was greatly esteemed in business circles.

The death occurred last Saturday, in his seventieth year, of Mr. René James Tahourdin, of Victoria Street, Westminster, who had been in practice for many years as a Parliamentary Agent. He had in his time had charge in the Committee-rooms of the two Houses of many Private Bills.

On Monday last week the death occurred at his residence at Edgbaston, Birmingham, in his eighty-first year, of Mr. Arthur Keen, Chairman and Managing-Director of Guest, Keen, and Nettlefolds, Limited—a concern with a capital of £3,000,000, and employing at least 30,000 hands. Deceased was for many years a Director of Bolckow, Vaughan, and Co., Chairman of the New Cransley Iron and Steel Company, a Director of the Loddington Ironstone Company, and a Director and some time Chairman of the Muntz Metal Company and of the London City and Midland Bank. He took a deep interest in the working of the Midland Iron and Steel Wages Board, and was for many years a member of its Standing Committee. He was a member of the old Smethwick Local Board for twenty-five years, and in this capacity he initiated much useful public work.

PRESENTATION TO MR. THOMAS COLE.

The ordinary business at the meeting of the Institution of Municipal and County Engineers on the evening of the 5th inst. was preceded by a very pleasant incident. It was a presentation by the members to Mr. Thomas Cole, Assoc.M.Inst.C.E., their former Secretary, of a gold watch and chain, with a cheque for £40, and a gold bracelet watch to Miss Cole, his daughter, in recognition of his valued services from 1881 to 1914. The event calls for special notice in the "Journal" from the fact that Mr. Cole was the Secretary of the first Institution of Gas Engineers, and consequently personally known to many readers. Mr. J. S. Pickering, the Borough Engineer of Cheltenham, the President, occupied the chair; and there was a large attendance of members.

In making the presentation, the President remarked that it was forty-two years since the Institution was formed, as the Association of Municipal and Sanitary Engineers and Surveyors; and now, under a more dignified title, it had a membership of upwards of 1700. One of the main reasons why the Institution had made such progress was that it had been fortunate enough to have as its Secretary one who had placed his devotion in the interests of the Institution above every other consideration. When Mr. Cole became Secretary, some thirty-three years ago, there were only some 200 members; so he had seen the membership increase by eight times during his long career as their official. In all his secretarial work, Mr. Cole had had the entire confidence of succeeding Councils, and he had the esteem of every member of the Institution. It was his (the speaker's) privilege, on behalf of his many friends in the Institution, to ask Mr. Cole to accept from them a personal gift in token of their esteem, and with their good wishes for his future welfare and happiness. He hoped that the watch would ever be a reminder to him—and the generations to follow him—that time could not eradicate the good he had done for the Institution, and that the chain might symbolize the bond of affection in which he was held by all its members. There was also a cheque for £40, being the balance of a limited subscription which had been contributed to by no fewer than 800 members of the Institution. He also asked Mr. Cole to accept for his daughter a gold watch bracelet, with a hope that she might wear it as a token of their affection for her father, and with sincere wishes from members of the Institution that Mr. Cole and those near and dear to him might have a future of unalloyed happiness.

Mr. Cole, who was received with applause, thanked the members for the enthusiastic way in which they had endorsed the President's kind and generous speech. He said it was difficult for him adequately to express his thanks for the exquisite token of their kindly sympathy, and their warm and generous appreciation of his life's work for their beloved institution. What the President had said and the approval of the members had filled him with indescribable joy; and however long he might be spared, that evening would brighten the rest of his days. It was not a farewell, but the cherished testimony of many valued friends.

ANOTHER PACKET FROM THE "B.C.G.A."

The British Commercial Gas Association is an advertising, educational, and information affording organization, with aims and policy that have been, and will continue to be, of untold benefit to the gas industry. Those in active command in the Association are thoroughly saturated with the idea that propaganda work is a necessary force in the development of the gas industry; and they equally believe that what is good for the development of the industry is salutary also in their own case. A little packet of literature to hand from the Secretary of the Association (Mr. W. M. Mason, of 47, Victoria Street, S.W.) is accompanied by a circular-letter, in which chairmen of subscribing undertakings are asked to say a few words at their shareholders' meetings, as to the value to the industry of the organization; the idea being that the shareholders, being enamoured of gas as an investment, and being itinerant in their habits as shareholders, will talk of the doings of the different companies in which they are concerned, and will perhaps put the pertinent question at other companies' meetings as to whether they too are subscribers to an organization that is found of such vast benefit in the gas industry generally. One never knows where scattered seed of this kind is going to fall, nor what harvest it will produce. It is to the benefit of the present subscribers to the Association, that there should be an extension of their ranks. Not that it will lighten individual contribution, but it will increase opportunity by additional revenue. The Association have not yet by any means reached the limits of their capabilities—given the wherewithal.

In a pamphlet accompanying the circular-letter are set out the reasons why it is to the advantage of every gas undertaking to subscribe to the funds of the Association. Aims and policy are both clearly described; and every page contains testimony to the value of the organization, from administrators of municipal and company undertakings, and from others associated with the industry. We like the extract reproduced from the Committee's report of the Lancashire Commercial Section for last year. From personal knowledge and information received, there is full agreement with the assertion that "the propaganda work of the Association has undoubtedly created a new atmosphere among gas consumers, which greatly assists the efforts of local undertakings to extend and increase their business." Lancashire is well to the fore among the counties in influential support of the Association. There are 38 members in the Lancashire Commercial Section, of whom 17 are subscribers to the Association, while 21 are not. But the 17 represent a production of 19,431,094,000 cubic feet of gas, while the 21 non-subscribing members represent a production of 3,675,287,000 cubic feet. These figures show that the administrators of the largest undertakings in Lancashire are persuaded as to the value of the work; but it would be a considerable source of strength to the Association to have on their books the remaining 21 undertakings. We know of no reason why they should not be there; but we do know of many reasons why they should be.

In the same packet of good things are three fresh examples of the business developing literature of the Association. "Coke and Its Uses" is the title of one. Coke may be going off smartly now through abnormal conditions; but gas undertakings will be wanting it to follow the same excellent course at the close of the war, or perhaps earlier still, when the coal stocks about the country are once more up to normal level. Because coke stocks have disappeared, the future claims that there shall be no slacking off in the prosecution of coke-development effort in the present. Then there is another leaflet entitled "A Message with a Point," in which the reproduction of a newspaper clipping shows that Professor Boys pays testimony to gas-fires. Another leaflet which should be freely distributed in the textile industry districts and among drapery establishments is on "The Effect of Gas Lighting on Coloured Fabrics." It is not a large packet this time; but it is full of good things.

Electrolytic Damage to Gas and Water Pipes.—We learn from the "American Gas Light Journal" that the Municipality of New Britain (Conn.) are being sued for damage to a building by the bursting of a water-main, and they attribute the failure of the main to electrolysis. The local Gas Company also complain of considerable trouble from stray electric currents. Because of this the Corporation counsel has prepared for presentation to the Legislature a Bill which proposes to make electric railway companies liable for all electrolytic damage to underground structures, including gas and water pipes.

The Late Mr. R. Forbes Carpenter.—At the last meeting of the Manchester Section of the Society of Chemical Industry, the Hon. Secretary of the Manchester Chemical Club (Mr. J. T. F. Bishop), referred to the sad loss which chemical manufacturers had sustained through the death of Mr. Russell Forbes Carpenter, late Chief Inspector under the Alkali Act. The speaker dwelt on Mr. Carpenter's early associations with the chemical trades of Manchester and the surrounding districts when resident as an Inspector, and referred at length to his relations with the Manchester Section of the Society of Chemical Industry. The speaker moved that the sympathy of the members should be addressed to Mr. Curphey (the present Chief Inspector), for conveyance to the relatives of the deceased; and this was unanimously agreed to.

COMPARATIVE WORKING RESULTS OF THE LONDON AND FOUR SUBURBAN GAS COMPANIES.

IN THE HALF YEAR ENDED DECEMBER 31, 1914.

Compiled by Mr. F. J. BRADFIELD, the Secretary of the Commercial Gas Company.

—	Gaslight and Coke.	South Metropolitan.	Commercial.	Brentford.	Wandsworth.	South Suburban.	Tottenham.
Gas sold . . . . . thousands	12,727,041	6,347,608	1,652,869	1,711,589	1,198,499	1,017,458	1,116,687
Increase . . . . . per cent.	Dec. 4·72	Dec. 4·29	Dec. 3·76	1·75	0·80	0·15	0·21*
Gas made per ton of coal . . . . cubic feet	12,420	12,614	13,797	12,113	12,395	13,097	12,926
„ „ per gallon of oil . . . . „	442	..	462	469	375	461	438
Gas unaccounted for . . . . . per cent.	6·64	6·59	8·29	6·58	6·78	8·75	8·36
Coke made for sale per ton of coal . cwt.	9·83	8·96	11·09	10·13	10·85	10·43	9·26
Tar made per ton of coal . . . . galls.	10·50	9·51	11·09	11·10	9·26	9·72	..
Liquor made per ton of coal . . . galls, 8 oz.	36·51	41·41	39·62	35·45	38·95	39·31	33·89
Percentage of coke used as fuel	20·35	27·37	11·25	18·98	13·18	19·77	25·25
Capital expended per 1000 cubic feet sold during the past year	s. d. 10 11·29	s. d. 8 0 33	s. d. 8 7·21	s. d. 7 2·29	s. d. 7 4·74	s. d. 9 10·57	s. d. 8 9·31
Price charged per 1000 cubic feet	2/6 to 2/10 / 2/2 to 2/4	2/2 and 2/4	2 4	2 4	1/9 to 2/9	2/3 to 4/2	2/- and 2/8
Costs per 1000 Cubic Feet of Gas Sold. REVENUE ACCOUNTS.	d.	d.	d.	d.	d.	d.	d.
Coals, oil, &c.	15·18	15·26	15·49	15·02	17·26	17·03	15·35
Less residuals—Coke and breeze	4·80	5·72	4·70	3·82	6·19	5·23	3·85
Tar	1·29	1·12	1·36	1·28	1·47	1·47	1·08
Amm. liq. and sulph. amm.	1·41	2·13	1·46	0·78	1·68	1·57	0·95
Total residuals . . .	7·50	8·97	7·52	5·88	9·34	8·27	5·88
Net for coals . . .	7·68	6·29	7·97	9·14	7·92	8·76	9·47
MANUFACTURE—							
Salaries	0·30	0·71	0·42	0·49	0·31	0·65	0·29
Wages—carbonizing	1·72	1·86	1·55	1·54	1·98	1·29	1·44
Purification	0·25	0·67	0·16	0·41	0·11	0·14	0·29
Repairs—plant	3·98	4·06	4·47	4·10	4·23	3·22	3·15
Net manufacture . .	13·93	13·59	14·57	15·68	14·55	14·06	14·64
DISTRIBUTION—							
Wages and salaries	1·12	0·81	0·77	1·27	1·36	1·43	1·01
Repairs—Mains and services, &c. . . .	1·76	1·42	1·40	2·01	1·86	2·74	3·24
„ Meters and prep. meters and fittings	1·98	2·25	2·10	1·14	1·05	2·28	1·93
„ Stoves—ordinary and prepayment .	1·97	1·34	1·58	1·86	1·61	1·51	1·27
Total net manufacture and distribution .	20·76	19·41	20·42	21·96	20·43	22·02	22·09
Public lamps—lighting and repairing	0·54	0·58	0·40	0·50	0·53	0·85	0·41
Rents, rates, and taxes	3·20	2·24	2·29	1·96	1·04	1·85	1·92
MANAGEMENT—							
Directors, Auditors, and salaries (Secretary, &c.)	0·26	0·26	0·33	0·44	0·58	0·84	0·52
Collectors	0·51	0·65	0·75	0·54	0·48	0·56	0·49
Stationery and general charges	0·29	0·60	0·50	0·35	0·66	0·59	0·56
Profit-sharing	0·32	0·76	0·54	..	0·50	0·57	0·54
Bad debts	0·11	0·07	0·06	0·08	0·06	0·05	0·04
Law and parliamentary charges	0·02	0·03	0·05	0·70	0·00	0·01	0·03
Superannuations, &c.	0·66	0·36	0·37	0·52	0·71	0·68	0·59
National Insurance	0·08	0·06	0·07	0·06	0·10	0·09	0·06
Sundries	0·04	0·03	0·02	0·00	0·01	..	..
Total expenditure (*less* residuals) . . .	26·79	25·05	25·80	27·11	25·10*a*	28·11	27·25
GAS	30·55	26·98	27·50	28·15	25·04	31·62	25·28
Rentals—Meters and prep. meters and fittings	3·18	3·35	3·09	3·77	2·97	2·54	2·04
Stove	1·42	1·46	1·80	1·14	2·36	1·78	3·95
Incand. mantle maintenance . . .	..	..	0·12	..	0·33	..	0·15
Miscellaneous	0·12	0·06	0·00	0·01	0·07	0·06	0·06
Total—Gas, rentals, &c.	35·27	31·85	32·51	33·07	30·77	36·00	31·48
Balance, being profit	8·48	6·80	6·71	5·96	5·67	7·89	4·23
Dividend and interest	11·13	7·77	9·37	7·28	7·31	8·79	6·33
Surplus	Def. 2·65	Def. 0·97	Def. 2·66	Def. 1·32	Def. 1·64	Def. 0·90	Def. 2·10
Contribution to funds and sundry payments . .	0·19†	..	..	0·40‡	0·38‡	..	0·54‡
SUNDRIES.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Coals cost per ton	16 1·82	14 9·57	17 10·39	..	17 0·12	18 3·02	18 2·24
Coke realized per ton of coal	5 11·56	5 6·48	6 10·41	6 0·16	6 3·52	6 3·39	5 8·43
Coke „ „ of coke	12 1·58	12 4·44	12 4·57	11 10·46	11 7·19	12 0·55	12 3·74
		Per Yard.				Per Yard.	Per Chal.
Breeze „ per ton	2 1·84	0 3·00	3 4·88	4 4·33	2 1·58	2 3·18	1 6·07
Tar realized per gallon	0 1·91	0 1·37	0 1·96	0 1·85	0 1·94	0 2·21	0 1·79
Amm. liquor, &c., realized per butt (8 oz.) . .	5 5·25	5 4·56	6 0·97	3 9·72	4 11·35	5 3·11	4 7·20
Percentage of stoves at rental to consumers . .	79	97	68	79	89	95	62
Bad debts per cent. on total receipts. . . .	0·27	0·17	0·15	0·20	0·15	0·12	0·11
Net profit per cent. on ordinary capital . . .	2·95	4·40	3·67	9·95	4·26	4·88	3·36
One penny variation equals in half year . . .	£53,029	£26,448	£6887	£7132	£4994	£4239	£4653
Carb. water gas, per cent. on total make . . .	26·57	..	32·01	41·97	10·65	18·97	36·11

† Redemption Fund.

a Capital Duty eliminated.
‡ Stamp Duty. * On Amalgamated Co.'s figures.

America and Aniline Dye Manufacture.—At the close of a paper read by Mr. Harry M'Cormack before the Chicago Section of the American Chemical Society, he gave as follows the reasons for aniline dyes not being manufactured in America: (1) Scarcity of capital available for investment in such industries. (2) Desire of the American capitalist to secure quick and sure returns on his investments, and his inability to see $2 in the distance where there are 50c. in the foreground. (3) Lack of co-operation between the colleges and universities and the chemical industries. (4) Lack of raw materials, due to waste of natural resources. (5) American characteristics of haste and impatience. (6) Unsatisfactory patent laws. (7) Low tariff on imported aniline dyes.

COMPARATIVE WORKING RESULTS OF THE LONDON AND FOUR SUBURBAN GAS COMPANIES.

TABLE SHOWING THE VARIATION, INCREASE OR DECREASE, ON FIGURES OF CORRESPONDING HALF YEAR, 1913.

[The figures in heavy type show the decreases.]

Compiled by Mr. F. J. BRADFIELD, the Secretary of the Commercial Gas Company.

	Gaslight and Coke.	South Metropolitan.	Commercial.	Brentford.	Wandsworth.	South Suburban.	Tottenham.
Gas sold . . . . . thousands	**630,712**	**284,425**	**64,552**	29,438	9,521	1,547	138,903*
Increase (variation equal to) . . . per cent.	**2·94**	**5·85**	**3·86**	**2·51**	**7·25**	**1·89**	**4·66**
Gas made per ton of coal . . . . cubic feet	114	**120**	71	93	**252**	154	**280**
,, ,, per gallon of oil . . . . ,,	11	..	13	18	**332**	461	**22**
,, unaccounted for . . . . . per cent.	**·20**	1·19	·99	**·38**	**·60**	·27	·94
Coke made for sale per ton of coal . cwt.	**·14**	**·79**	·12	**·39**	·40	**·03**	·07
Tar made per ton of coal . . . . galls.	·27	**·22**	·67	·89	**·31**	**·19**	..
Liquor made per ton of coal . . . galls, 8 oz.	**·50**	·13	**·05**	·52	2·62	**·20**	**4·42**
Percentage of coke used as fuel	·03	6·28	**1·00**	3·12	**3·20**	·27	·25
Capital expended per 1000 cubic feet sold during the past year	s. d. 0 1·09	s. d. 0 1·38	s. d. 0 1·12	s. d. **0 0·16**	s. d. 0 1·83	s. d. **0 0·50**	s. d. 0 11·97
Price charged per 1000 cubic feet	0 2·00†	0 2·00†	..	..	..	..	**0 1·00**
Costs per 1000 Cubic Feet of Gas Sold.							
REVENUE ACCOUNTS.							
Coals, oil, &c.	d. **·48**	d. **1·60**	d. ·42	d. **·24**	d. **1·18**	d. **2 90**	d. **·03**
Less residuals—Coke and breeze	**2·19**	**1·63**	**·55**	**1·14**	**1·03**	**2·09**	**·95**
Tar	**·32**	**·84**	**·17**	**·12**	**·35**	**·68**	**·25**
Amm. liq. and sulph. amm .	**·62**	**·46**	**·29**	**·19**	**·26**	**·83**	**·39**
Total residuals . . .	**3·13**	**2·93**	**1·01**	**1·45**	**1·64**	**3·60**	**1·59**
Net for coals	2·65	1·33	1·43	1·21	·46	·70	1·56
MANUFACTURE—							
Salaries	·02	·08	·03	·09	·08	·10	·01
Wages—carbonizing	**·13**	·02	·00	·15	·23	·11	**·01**
Purification	**·10**	**·07**	**·03**	·15	**·23**	·04	**·01**
Repairs—plant	**·69**	**·34**	·67	**2·13**	·18	**·06**	**1·08**
Net manufacture . .	1·75	1·02	2·10	**·53**	·72	·89	·47
DISTRIBUTION—							
Wages and salaries.	·03	·04	**·04**	·09	·10	**·04**	**·06**
Repairs—Mains and services, &c. . . .	**·04**	**·16**	**·16**	**·59**	**·35**	·13	**·43**
,, Meters and prep. meters and fittings	·15	**·78**	·13	·15	**·30**	**·03**	·50
,, Stoves—ordinary and prepayment .	·06	**·20**	**·01**	·07	**·43**	·11	·03
Total net manufacture and distribution .	1·95	**·08**	2·02	**·81**	**·26**	1·06	·51
Public lamps—lighting and repairing	·04	**·04**	·02	·00	**·08**	**·21**	·08
Rents, rates, and taxes	·30	·18	·14	·12	·02	**·17**	·02
MANAGEMENT—							
Directors, Auditors, and salaries (Secretary, &c.)	·02	·00	·02	**·01**	**·02**	·08	·07
Collectors	·03	·05	·05	·01	·03	·01	·04
Stationery and general charges	·01	·08	·09	·04	·22	·04	**·05**
Profit-sharing	**·09**	·04	·01	..	·00	**·14**	·05
Bad debts	·00	**·01**	·01	·00	·01	·01	·00
Law and parliamentary charges	**·02**	**·01**	·02	·66	**·02**	·co	**·77**
Superannuations, &c.	·15	·14	·05	·03	·28	·00	·52
National Insurance	·00	·00	**·01**	**·01**	·00	·09	**·01**
Sundries	·01	·02	·00	**·03**	·00	..	..
Total expenditure (*less* residuals) . . .	2·40	·37	2·42	·00	·18	·77	·46
GAS	1·15	1·48	**·09**	·00	**·32**	1·12	·04
Rentals—Meter and prep. meter and fittings	·16	·03	·04	·25	·08	·05	·11
Stove	·16	·14	·15	·15	·20	·17	·11
Incand. mantle maintenance . . .	..	..	·01	..	**·10**	..	**·03**
Miscellaneous	·02	·01	**·01**	·00	**·08**	**·01**	·00
Total—Gas, rentals, &c.	1·49	1·66	·10	·40	**·22**	1·33	·23
Balance, being profit	**·91**	1·29	**2·32**	·40	**·40**	·56	**·23**
Dividend and interest	·28	1·41	·43	·c8	·49	**·23**	·76
Surplus	**1·19**	**·12**	**2·75**	·32	**·89**	·79	**·99**
Contributions to funds and sundry payments .	**·08**	..	..	·40	·00	..	·54
SUNDRIES.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Coals cost per ton	**0 4·07**	**1 11·06**	0 11·53	..	**1 2·17**	**1 2·38**	**0 1·57**
Coke realized per ton of coal	**1 8·05**	**1 7·32**	**0 6·80**	**1 6·83**	**0 9·28**	**0 6·95**	**1 1·93**
Coke ,, ,, of coke	**3 2·10**	**2 3·53**	**1 2·09**	**2 6·52**	**1 11·12**	**1 0·81**	**2 7·39**
		Per Yard.				Per Yard.	Per Chal.
Breeze ,, per ton	**2 5·67**	..	0 3·53	1 10·56	**0 7·49**	**0 3·70**	**0 4·70**
Tar realized per gallon	**0 0·31**	**0 1·03**	**0 0·24**	**0 0·23**	**0 0·37**	**0 0·33**	**0 0·34**
Amm. liquor, &c., realized per butt, 8 oz. .	**1 6·06**	**1 4·05**	**0 10·80**	**0 9·61**	**0 10·54**	**1 1·78**	**0 11·59**
Percentage of stoves at rental to consumers .	3	**2**	2	1	..	6	6
Bad debts per cent. on total receipts . . .	·02	**·01**	·01	·00	·02	**·07**	·02
Net profit per cent. on ordinary capital . .	**·92**	·76	**1·82**	·56	**1·03**	·30	**1·07**
One penny variation equals in half year . .	**£2628**	**£1185**	£269	£123	£40	£6	**£421**
Carb. water gas per cent. on total make . .	6·98	..	3·19	1·69	5·89	18·97	3·89

* This figure represents the variation on the absorbing Company's own figures, and not on those of the amalgamating Companies, whereas on the preceding table the increase on the "Gas Sold" is on the amalgamated figures.

† From Michaelmas.

The name of Mr. W. Hill, the Engineer and Manager of the Stalybridge Corporation Gas Department, should have been mentioned as having taken part in the conversational discussion which followed Mr. Tookey's lecture, as reported in last week's "JOURNAL," p. 325. By inadvertence, our reporter gave the name of Mr. William Carr.

ELECTRICITY SUPPLY MEMORANDA.

OUR friends the "Point-Fives" have held another of their genteel little meetings, at which they said most amiable things one to the other, uttered many things to which expression has been given before, and, consistent with previous performances, did not add much to the sum of human knowledge. Altogether there was a flatness about the discussion—if the officially prepared report is anything to judge by. Mr. Harold Gray, who at Accrington has adopted bye-product gas-producer plant and gas-engines for generating electricity, was in the chair. The salient feature of his address appeared to be the announcement of a rooted desire on his part to create discord among shop-keepers, hotel proprietors, and the landlords of public-houses, by giving some of them preferential terms because they happen to be sufficiently affluent to occupy business premises in extra good situations, and so are highly rated. The good situations and the high rating appear to constitute a reason for special electrical relief. Briefly stated, how Mr. Gray proposes to afford this is by a development of the rateable-value-*plus*-½d.-per-unit system. He finds the difference in rating a serious drawback to the elaboration of the rateable tariff system. The way he suggests that further tariff muddle should be created is by charging a rate based on a sliding-scale of percentages on rateable value, and fixed price per unit. Thus the higher rated premises would have a lower percentage charge on the rateable value than the smaller ones. Rateable value itself has no relation whatever to consumption; and to complicate matters further by starting percentages on rateable value would, it seems to us, soon additionally affect the good statutory principle that there shall be no undue preference for "corresponding supplies." The idea to which Mr. Gray gave birth did not seem to meet with the universal approval of the remaining "Point-Fives;" the general feeling being that, for the premises in view, a flat-rate with discount according to consumption, or the maximum demand system, would meet requirements justly and well. Mr. Gray says he finds there are a number of big shops using artificial light in their interiors for all the working hours of the day during many months of the year, for which, where a flat-rate for electricity is in force, gas illumination is employed. We thank Mr. Gray for this piece of testimony to the economy of gas. It shows that, in order to capture these consumers from gas, it is necessary to offer them a preferential rate for electricity. One point more on this subject. Mr. Cooke, of Luton, raised his voice in advocacy of a flat-rate of ½d. per unit for cooking and heating, and held that at this figure the business is a paying one. After Mr. Cooke has studied Sir John Snell's Southampton report, and that gentleman's presidential address to the Institution of Electrical Engineers, it would be interesting to hear him try to convince Sir John that he is a very foolish man on this question.

Tampering with the Rateable Value System.

Domestic Uses.

Among other subjects, it is interesting to learn from Mr. Gray that, for a given size of undertaking, where the 0·5d. tariff is in operation with or without a fixed charge, the demand for domestic electrical appliances is greatly in excess of that in a flat-rate district. No data are published. This is a subject on which electrical engineers are very reserved, and prefer generalization. Some "Point-Fives" are rather disappointed over the vast majority of prudent people who reside in their areas. It is also learned, from various speakers, that the new hot-bar type of electric-heaters is gaining ground over the old lamp form of "radiators." Then it is seen that Mr. Gray opposes himself to the experts who claim that electric-cookers must be supplied with all sorts of accessories in order to realize indispensable economy and efficiency. He asserts that a thoroughly reliable cooker can be obtained at a reasonable price, provided all elaborations are excluded. "A cooker built on similar lines to a gas-cooker, of cast iron, having removable fittings, with hot-plate and grill on the top of the oven, and without circuit indicators, thermometers, inspection windows, &c., *appears* to give satisfaction in the majority of cases." Only "appears to give." We can let it stop at that. The old libel on the gas-cooker cannot be omitted: "Its operation is better than a gas-cooker." Mr. Gray manifestly does not know how to use a gas-cooker. Most electrical men own to being very deficient in manipulative power and common sense in connection with the use of such cookers. Their intelligence cannot rise beyond set switches and three or four temperatures for all purposes. They judge other people by themselves. Other people judge the gas-cooker by what is produced by it; hence its vast popularity, and the slow progress of electric-ovens. That Mr. Gray's simple preference for a simple electric-oven means a deteriorated efficiency in operation is shown by the opening words of the next paragraph of the address: "For better class work, where the consumer will pay an increased price, useful elaborations are much valued." Other of the "Point-Fives" are opposed to any standardization of electric-cookers at the present stage of their development. Then Mr. A. H. Seabrook gave another airing to his oft-told tale about the thermostatically controlled electric hot-water system for wash-basins in the Oxford Circus conveniences. In this he reiterated his statement that "the cost at present was slightly lower than for gas." But under no circumstances are definite figures published; nor has Mr. Seabrook ever shown any sportsmanlike desire to have his assertions tested against a modern thermostatically controlled gas-heating system, either in the matter of expense, time, or anything else, starting all cold. When he has reduced "the cost still further by at least 20 per cent.," perhaps he will then arrange with the Gas Light and Coke Company for a comparative demonstration on the cost and time lines with a modern gas-heating equipment. Following this, Mr. Seabrook, the report states, mentioned a block of flats now being erected in his district which is being wired for electric heating, cooking, and lighting. An electrically-heated water system is also being installed; and the "estimated" consumption per annum of this block of flats is a million units, or 2500 units per head of population. Heavens! How envious one could be of these Marylebone millionaires. Even at ½d. per unit (without taking into account the average of the fixed charge on the rateable value system), the cost per head will be £5 4s. 2d. per annum. For a family of six, the cost will be £31 5s. a year, *plus* the fixed charge! We are satisfied. And this is only an "estimate;" and electrical "estimates" have a time-honoured custom of never erring upon the right side.

Merz and Big Ideas.

Mr. Merz, who is mainly responsible for the technical side of the scheme by which the London County Council propose to, at some time or other, regenerate the electricity supply of London, has been delighting the Students' Section of the Institution of Electrical Engineers on a subject of which he is master, and by which he has managed to arouse such a mass of electrical opinion contrary to his own from men who are not prepared to accord him a superior position to their own as masters in their profession. His paper is not to be published; but running surveys of its contents have been made in the Electrical Press. One report—that of "Electrical Industries"—states that, in listening to Mr. Merz, it was impossible to avoid reflecting on the evil fate that places an engineering problem at the mercy of complex political and personal influences. It is perhaps a matter for regret that this should be so; but no better tribunal is put forward. If one has a tribunal of technical men, there is always the danger of rooted preferences and prejudices, though, if asked our private opinion, we should be prepared to risk that rather than the one of want of qualification and of judicial competence. The known technical competence of engineers who have taken sides over the schemes for London proves the truth of the contention as to the difficulty of obtaining a proper final decision. Mr. Merz holds that the main principles on which the highest reliability and economy in electrical supply can be secured are size, interconnection, and diversity of demand. It is stated that Mr. Merz supplied figures which provided a very striking comment upon those engineers who are quite content with the present state of progress with isolated stations. But the figures that Mr. Merz presents for London are computations with a hypothetical basis, and are not drawn from actual experience in London. Figures drawn from experience in London do not, as (for instance) regarding average price, look by any means ridiculous against those that are suggested will obtain when?——when in the distant future, the great Merz scheme has been (if it ever is) developed; and, in connection with which, it is proposed there shall be provision for falling-back upon the rates if (there is no certainty about the scheme) it is found that both ends of finance cannot be made coterminous, which would likely be somewhat often in view of the huge capital involved and the big scrapping of plant. However, Mr. Merz has large ideas; large ideas are the very soul of his life. He looks forward to the day when electricity generating plant of a total capacity of 2 million kilowatts will be required for Greater London. Generation on this scale would demand 115 acres for coal storage, taking three months' supply as the minimum.

Mammoth Schemes and Diversity of Demand.

As to the interconnection of supply and diversity of demand, Mr. Merz finds something very funny in a condition of things under which a Londoner, in an ordinary day, uses several independent sources of electricity supply. "He shaves by the light from one set of mains, travels to town on an electric train supplied from another station, has his office heated by current from a third source, lunches in a restaurant which taps another company's system, goes west in the evening to his club where he finds another voltage, visits a theatre supplied from still another source, and so on. The diversity of the demand which each individual represents is thus lost among different stations; interconnection would make the diversity effective for the purposes of economy in generation." The same argument might be applied to many other services; and if in connection with them all, Mr. Merz's ideas were acted upon, we should become a nation subservient in all our dealings to a form of massive and unwieldy trust. Independence and individuality would be knocked on the head; and we should get into innumerable and ever-deepening ruts, from which there would be no escape, through the stereotyping of supply. To be the slaves of these huge systems does not give us the promise of that continuous efficiency or maximum economy which we look for from the progress made by broadly spread effort. There must be a limit in size where maximum economy

is reached, and over the limit economy commences to slide downhill. There has not been a tittle of evidence that electricity supply is an exception to this rule. The only real advantage that has yet been put forward as resulting from the scheme is that there would be co-ordination of the systems of supply. It may be mentioned that Mr. Merz is of opinion that electric cooking has reached a "fairly satisfactory" condition, owing to the improvement of apparatus and the lowering of tariffs. In regard to electric heating, he thinks the apparatus is primitive, and that the question has not been studied scientifically, so as to determine the best temperature for the heating elements and their proper distribution.

The Vox Populi.

The case strengthens against municipal electric supply departments having hiring and wiring powers; and when the evidence is pieced together, it is seen that Parliament has ample popular support for the course taken in not allowing anything but regulated trading in this direction—the same regulation is now placed by Parliament upon municipal gas departments asking for powers to hire-out and deal in gas-fittings. When the Incorporated Municipal Electrical Association were canvassing municipalities for support for their Bill, they did not get an extraordinary amount of encouragement; when they asked municipal authorities prior to the parliamentary session of 1914 to get their local members of Parliament to vote for a place for the Bill, the resulting promises were so scanty that the promoters were disheartened, and their hope of ever seeing the impudent little Bill get a few steps forward dropped at once to below zero. One by one the hiring and fittings clauses in the Municipal Bills lodged in the present session are being expunged. At Edinburgh, they were removed from the measure promoted by the Corporation. Now at Doncaster a poll of the burgesses on the electric fittings clauses has resulted disastrously. For the clauses, only 796 votes were recorded, and against 1291. If ever the Electrical Association Bill comes before Parliament, this vote at Doncaster can be used as an illustration of what would probably happen in most places where the local authorities run electricity undertakings if the ratepayers were asked to give a verdict on the matter. The Bill, being put forward as a general one, avoids subjecting the proposed power to the veto of the ratepayers. Parliament will not fail to see the point by a reference to Doncaster.

A Tight Corner.

Some electricity concerns boast that they are well stocked with coal, seeing that they have had to use less this winter than the provision made for maximum electricity supply. This is all very well as one side of the question. But electricity stations have not been better favoured than gas undertakings in the matter of coal supply during the period of maximum consumption; and gas-works have been eating into stocks rather more extensively than meets with the approval of the responsible managements. But we have not heard of a single gas-works that has been in such a tight corner as the Wimbledon electricity supply works—a corner so tight that a fortnight ago the consumers received a circular notice to the effect that it might be necessary to restrict the output of current for all purposes within a few hours, unless coal could be obtained to keep the plant running. The circular sent the electric patrons rushing about for candles, lamps, and oil, in order to protect themselves from the disaster of being plunged into outer darkness through a callous electricity supply concern. Fortunately a small supply of coal saved the consummation of the worst fears; but the station has since been living from hand to mouth in regard to coal. The St. Pancras Borough Council Electricity Station also seems to be in a precarious condition. Continuous correspondence has been going on with the Midland Railway Company, the War Office, the Railway Executive Committee, and the collieries whence supplies are obtained under contract, calling attention to the difficulty of securing deliveries, and urging one and all to do something to relieve the situation. Unless there is improvement, it is said it will be serious for the local factories, many of which are engaged on Government work, and use electric power.

THE DISPOSAL OF COKE.—Part III.

AND SOME MEANS FOR INCREASING ITS SALE.

By a Gas Engineer.

THE question of delivery must always be an important one; for this item will bear a good proportion to the cost of the material. Transport by barge or railway waggon lends itself admirably to the requirements of large works; and if customers are able to take delivery in this way, and the works can accommodate such means of transport, there is no doubt it is the best means to adopt.

CARTAGE OF COKE IN BULK.

But in most cases cartage by road will be the only practicable means of delivering the coke to a customer; and it is this method which will now be considered. The cheapest means of road transport, if the coke can be taken in bulk, is undoubtedly by steam-waggon. In fact, if suitable provision be made for filling these waggons from overhead coke-hoppers, and an end or side-tipping waggon be employed, coke can be carried at very small expense, whether for short or for long distances. In such cases waggons should be constructed to carry a load of at least 5 tons of coke; and it is preferable to run them on rubber tyres, for thereby the speed can be legally increased to 8 miles per hour, as compared with 5 miles per hour when the waggon is fitted with steel-tyred wheels. The extra speed is a consideration, and will enable a waggon to cover a substantially increased distance per diem; and, further, being fitted with rubber tyres, it will cause it to run more smoothly, thereby resulting in less breakage to the coke and less wear and tear to the mechanical and other parts. Given quick loading and fair despatch on a customer's premises the cost of transport, including labour, fuel, wear and tear, interest, depreciation, insurance, &c., within a distance ranging to four miles from the works, should not much exceed 1s. per ton of coke.

It is obvious that it is only large customers who could be expected to take delivery in such a way; but it is worth while to offer considerable inducements in the matter of delivery price to obtain such business. If shown an advantage in £ *s. d.*, many customers will be found willing to alter their premises to suit such a method of delivery. If, however, 5 tons is too large a unit for some customers, an effort should be made to effect deliveries by means of horse-drawn tip vans, constructed, if the district be a fairly level one, to hold 2 tons of coke. Failing any facilities to deliver in bulk, recourse must be had to the much more unsatisfactory method of delivery in sacks by steam-waggon or horse van. Not only is the cost of loading into sacks more expensive by anything from 4d. to 8d. per ton, but the wear and tear of sacks will also cost about 2d. per ton of coke. Therefore, steps should be taken to ascertain the facilities which exist on customer's premises for taking delivery, with a view to making suggestions to enable coke to be supplied in the most advantageous manner, offering inducements which appeal to the pocket. It must not, moreover, be forgotten that where coke is delivered in bulk, much more tonnage can be dealt with by the one man, horse, and van than is the case with deliveries by sack.

CARTAGE OF COKE IN SACKS.

In the latter case, it is a moot point whether it is more profitable to employ the steam-waggon or the horse van. Certain deliveries will be cheaper by the one or the other, depending chiefly upon the distance of transit. Long journeys which can profitably be made by the former would be prohibitive by the latter; and with short journeys the opposite would be the case. Where the limiting line can be placed is not at all certain; but it will not be far from the 3 to 4 mile radius. The most unsatisfactory feature of the steam waggon is the amount of labour which must be sent to unload the coke; and in this respect it compares unfavourably with the unloading of the horse van by the carman. With the steam-waggon not much in the way of unloading may be expected of the driver, who has certain duties to perform in connection with his engine and boiler, and who considers it *infra dig.* to do labourer's work of this sort; so that it is necessary to send at least three men in all with a 5-ton load in sacks. If insufficient labour be provided, the unloading will be inordinately long, and the daily tonnage output greatly decreased. It is a case of the finding of the happy medium. If the undertaking be sufficiently large, there is usually enough justification for employing both steam-waggons and horse-drawn vehicles—suitable work being chosen for each type.

Above all things, it is strongly advisable to cultivate trade which will permit of delivery of coke in bulk by self-tipping vehicles, as by this means very considerable expense can be saved. In many cases it only requires intelligent observation of the facilities which exist at a customer's premises, and a readiness to share the advantage which results from bulk deliveries with the particular customer.

DELIVERY IN "FULL" LOADS.

In those cases where there is no alternative to delivery in sacks, it is important to obtain permission to supply in full loads—whatever that may be in the particular district. The "full" load will depend upon the gradients to be negotiated and the state of the roads. In the writer's experience this is 2 tons for a fairly level neighbourhood in the case of single horse drawn vehicles; but for certain parts it is necessary to use a chain horse. The difficulty can, of course, be overcome by loading-up more lightly when delivering in hilly districts.

If a definite policy of inducing customers to take "full" loads be adopted, a great deal of work will be saved, and more tonnage will be handled per horse, van, and man. To effect this, it is a good plan to make a rule of quoting for "delivery in full loads of 2 tons each." If only 1 ton or 1½ ton loads can be taken, 3d. to 5d. per ton should be added to the price to provide for the extra expense of delivering in smaller quantities—even if it be only 3 chaldron (36 cwt.) instead of 2 tons.

In the same way it will be found to be a good plan to adopt differential delivery rates—one rate for full loads and a higher rate for smaller quantities. In the writer's experience single hundredweights of coke and upwards are delivered in the district of gas supply, deliveries ranging up to about 3½ miles from the works, at a flat-rate of 2d. per cwt., and for full loads of 2 tons each 1½d. per cwt. These rates fairly represent the difference in

cost between delivering in small quantities averaging not more than (say) 8 cwt. and in quantities of 2 tons.

Delivery on Flat-Rates.

As flat-rates have been mentioned, it may safely be asserted that substantial reasons can be given for adopting a system of charging for deliveries on a flat-rate. If this is done on a mileage basis, there is always a great deal of confusion as to the exact points where the first mile ends and the second begins, and so on. For this reason it is often impossible to off-hand quote a customer, and, if given hurriedly, it leads to mistakes. Further, in many cases, a customer can never ascertain from published price lists, until the question is asked, what his price will be. There is another good reason for adopting flat-rates, and that is that it puts the customer on the outskirts of one's district on the same footing as the one outside the works' gates. This is no mean advantage, for the customer on the fringe of the district will probably be near another gas-works. For this reason the flat-rate, which may be considered to be an average rate, operates favourably to such a customer, and will be the means of enabling a gas undertaking to retain its trade over a large area. There is no doubt that this system greatly simplifies quotations and bookkeeping, and will always prove popular with those who attend to coke sales. Beyond certain distances a flat-rate would operate unfairly; but where the limiting line would be it is difficult to say, though one might hazard the remark that should a flat-rate be made to extend beyond 3 or 4 miles at the most, it would act unfairly on those close to the works.

In the matter of coke cartage, the writer ventures to assert that deliveries should always be done at a profit. It should not be thought sufficient to sell the coke at a satisfactory price, and then do the delivery at cost price, which, in fact, may well be turned to a loss should full account not be taken of every item that might fairly be included. Interest on capital, ample allowance for depreciation, rent of stabling, and other charges, which are sometimes excluded, must all be taken into account before arriving at the profit. In delivering coke it must be realized that the seller is selling two things, coke and cartage, each of which should be disposed of at a profit—if, that is to say, it is reasonable to speak of selling a bye-product at a profit.

Tip-Vans.

It has already been stated that a trade should be cultivated for coke in bulk; and this being so, tip-vans are required to deal with the trade. These vans should hold 2 tons of large coke; the space required being calculated at the rate of 90 cubic feet per ton. The same van should also be suitable for delivering in sacks; and with this idea in view sufficient platform area must be provided to allow for the maximum quantity of sacks to be stacked in a vertical position on the bottom of the van. It is fair to assume that a sack of coke occupies a space of 1½ square feet on the floor of the van; so that 60 square feet are required to stack 40 sacks vertically. For a non-tipping van this can be arranged by making a van 10 feet long and 4 ft. 10 in. wide, with a tailboard 2 ft. 6 in. wide—thus giving in all a platform area of 60 square feet.

With a tip-van, 10 ft. long by 4 ft. 10 in. wide by 3 ft. high, 2 tons of large coke can be supplied in bulk to customers; while, if required, such a van is almost equally suitable for delivering coke in sacks.

Advantage of Filling Sacks.

In delivering broken coke or forge coke, of ¾-inch size, provided that the whole load is being supplied to one customer, some considerable advantage can be obtained by loading the sacks as full as possible. In this way, from 20 to 30 sacks, according to size of coke, may be made to hold 2 tons, without, moreover, filling them too full. This plan enables one to economize in sacks, in space on a van, and, what is more important, saves the man from 10 to 20 journeys with a sack on his back in unloading 2 tons, which he usually much prefers to taking a smaller weight for a greater number of times. This procedure would, of course, be absolutely barred should the van be taking coke to more than one customer, and even when delivering to one customer it should first be explained to them and the delivery ticket should clearly state—".....Coke in.....Sacks."

Steam Waggons for Coke Deliveries.

A steam-waggon purchased for the purpose of delivering coke should fulfil the following conditions:

1.—It should be of the correct size—3, 4, 5, or 6 tons—to suit the class of trade done. The size of unit is obviously a matter depending upon local conditions.

2.—It must be an end or side tipping waggon for delivering in bulk, and must, therefore,

3.—Have high sides to accommodate the full load of large coke in bulk, and, in spite of being a tipping waggon,

4.—It must have the maximum possible platform area to accommodate a large proportion of the sacks in a vertical position on the floor of the platform.

5.—To enable this to be done a tailboard should be provided on hinges to support a number of sacks in the same manner as is done on a horse van.

6.—The wheel base should be as short as possible—to enable sharp corners to be negotiated; this being very necessary in delivering loads in many customers' premises.

The above requirements are rendered necessary by the facts that coke is a bulky material; that customers can usually find room for a few tons only at the most; that provision must be made for delivering both in bulk, and in sacks; and that it is frequently required to manœuvre a waggon in awkward places when delivering coke.

A study of the characteristics of the principal makes of steam-waggons will disclose the fact that the above conditions can only be fulfilled by adopting a waggon with an undertype engine—that is to say, with the engine fitted underneath the body. By this means much more room is left for the platform, and at the same time without necessitating a long wheel base. There is no disadvantage in having the engine in this position; but, on the contrary, it is thereby better protected against dust and grit. In choosing a waggon for this class of work it must not be overlooked that a short wheel base will be an incalculable advantage on countless occasions.

Petrol driven waggons have not been considered for the reasons that the fuel is so large an item with heavy vehicles; while with a steam waggon it is so small an expense, and is, moreover, a product of the gas-works, as coke can and should invariably be used. Steam-engines, too, are much simpler to repair and keep in good running order; while the work's mechanics usually have no experience of petrol engines. These in practice constitute very sound reasons for the preference given to a steam-waggon.

RECOVERY OF TOLUENE FROM GAS.

Dr. Davidson's Plant.

It will probably be remembered that in the course of the proceedings at the conference on coal supplies held in Manchester on the 5th inst., and reported in the "Journal" last week (p. 307), Mr. Macintosh Williams, who attended on behalf of the War Office Committee on the Supply of High Explosives, of which Lord Moulton is Chairman, referred to the shortage of toluol and to the action taken by the Committee with the object of obtaining the necessary quantity to meet requirements. He stated that satisfactory arrangements had been made with the tar distillers; and the coke-oven manufacturers were approached, and did what they could. Subsequently an appeal was made to the larger gas undertakings that they would make arrangements to wash the toluol out of their gas, and, in case of need, replace it with benzol if this was necessary to preserve the illuminating and calorific power. The War Office at first proposed to seek the assistance of those gentlemen who were carbonizing 80,000 or 90,000 tons of coal per annum. They thought that if the wash oil employed for washing or scrubbing the gas was first pre-benzolized, it would only take up the toluol contents of the gas, and leave the benzol contents to a certain extent intact. Birmingham had made experiments, and they found that if the oil was pre-benzolized to the extent of 5 per cent., it was possible to extract nearly 80 per cent. of the toluol contents, and leave more than two-thirds of the benzol contents still in the gas. If this was the case, it would materially assist the Government.

Mr. Williams mentioned that Dr. W. B. Davidson, the Engineer-in-Charge of the Nechells station of the Birmingham Gas Department, had drawn up a rough sketch of the plant which he thought might be adopted to effect the object in question; and by his courtesy, and that of Captain Hilton, the Secretary and Manager of the Department, we are able to reproduce it, accompanied by a description. There is from twenty to forty times as much toluene in the gas made from a ton of coal as there is in the tar produced from this bulk of raw material; and we understand that probably at least 2 lbs. of pure toluene, making 4 lbs. of trinitrotoluene, can be readily recovered per 10,000 cubic feet of coal gas. It is interesting to note that it was Dr. Davidson's former connection with the Arsenal that gave him an opportunity of propounding his scheme to Lord Moulton. Both he and Captain Hilton have been working hard on the subject for a month; and Dr. Davidson expects to start washing with gas oil at the Nechells works this week.

PROCESS FOR THE RECOVERY OF TOLUOL FROM COAL GAS.

Coal Carbonized—800 Tons per Diem.

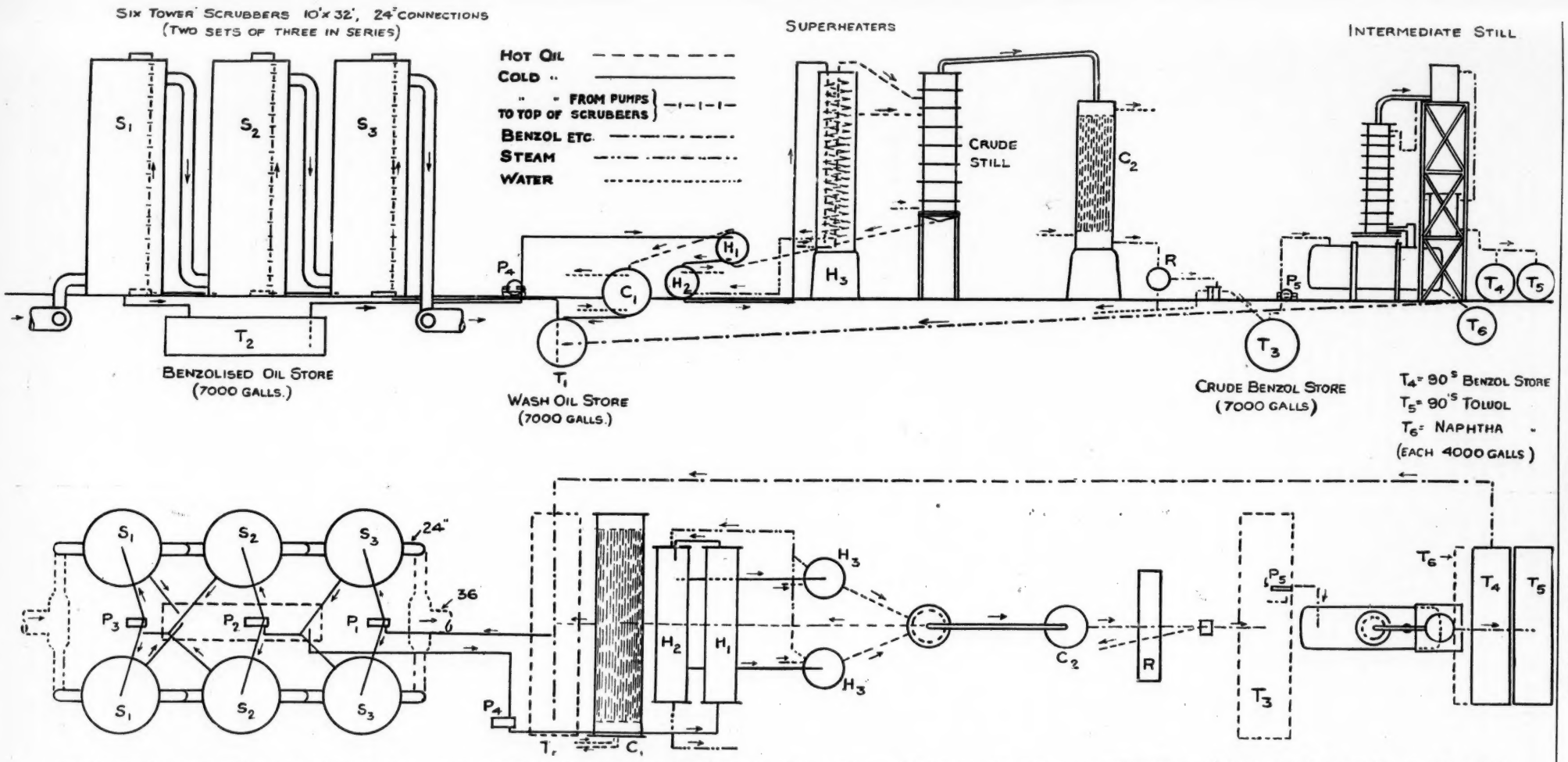
[See Accompanying Sketch.]

The stream of cooled debenzolized oil coming from the crude still is mixed with a small stream of benzol in tank T_1.

The content of benzol in the mixture is regulated according to the flow of oil and the degree of saturation obtained in the scrubbing process. This will probably be 4 or 5 per cent. by volume.

The wash oil thus prepared is pumped at the required rate (about 1300 gallons per hour) by pump P_1 to the top of scrubbers S_3; then by pump P_2 from the bottom of S_3 to the top of S_2; and finally by pump P_3 from the bottom of S_2 to the top of S_1.

The oil now benzolized runs from the bottom of S_1 to the store-tank T_2, whence it is pumped by P_4 in a continuous stream at the rate of about 1300 gallons an hour through the heater H_1, where heat interchange takes place between the cold oil and the hot oil leaving the crude still; then through the exhaust steam-heater H_2; then through the superheater H_3 (containing a closed high-pressure steam-coil) to the crude still, where it falls down from



ELEVATION AND PLAN OF PLANT FOR THE EXTRACTION OF TOLUOL FROM COAL GAS.—CAPABLE OF DEALING WITH 800 TONS OF COAL OR 10 MILLION CUBIC FEET OF GAS PER DIEM.

tray to tray to the lowest compartment—meeting a current of high temperature steam, which deprives it of its crude benzol.

The hot debenzolized oil is drawn off—preferably by gravity, and caused to flow first through H_1, and afterwards through a water condenser C_1 to the store-tank T_1. The crude benzol vapours and steam are condensed in the water condenser C_2. The condensate flows to a receiver R, whence it passes through a separator; the crude benzol being stored in the tank T_2.

A charge of about 1600 gallons of crude benzol is pumped by P_5 daily into the intermediate still (either of the Heckmann or the Savalle type), where it is distilled by steam with the production: Firstly, of commercial benzol; secondly, commercial toluol; thirdly, residual xylol and heavier oils. The commercial benzol is mixed with the wash oil, together with an additional quantity corresponding to the amount of toluol, &c., permanently removed from the gas. The commercial toluol is re-distilled in a second still of the Heckmann or Savalle type, on a central works, for the production of pure toluol.

If the wash oil contains much naphthalene, it may be necessary to return the xylol to the gas, to prevent naphthalene stoppages in the district services.

Gas oil will probably prove the most suitable oil for washing purposes, as it is generally ready to hand, contains no naphthalene, and readily absorbs crude benzol.

The oil may be worked up to a high degree of saturation without appreciable loss of toluene; a considerable proportion of the benzene, which is more difficult to catch, going forward in the gas.

GAS-FURNACE EXHIBITION AT SHEFFIELD.

An exhibition of gas-heated furnaces for industrial purposes, organized by the Brayshaw Furnaces and Tools Company, Limited, of Manchester, is being held in Sheffield, which is wonderfully significant of the remarkable development that is taking place in the industrial applications of gas, especially as regards the heat treatment of steel. Some thirty types of their furnaces suitable for various purposes, including annealing furnaces for bars up to 16 feet length, are shown in operation. Both air blast and natural draught are employed; the blast heated furnaces being fitted with the Brayshaw patent burner, as used in the Royal Mint. A list of some of the different appliances exhibited will serve to show the many ways in which gas heating enters into the treatment of Sheffield steel. Thus there are crucible melting furnaces, salt bath and lead bath hardening furnaces, and furnaces for forging, tempering, quenching, annealing, case-hardening, and many other purposes. Registering pyrometers and a number of special forms of milling cutters and other tools are also exhibited.

At the opening ceremony, which took place on Monday afternoon of last week,

Mr. Hanbury Thomas, the Managing-Director of the Sheffield Gas Company, who presided, spoke of the notable increase there had been in the last few years in the application of gas to industrial purposes in Sheffield. The efforts of the Gas Company had resulted in the installation during last year alone of furnaces and burners valued at over £4500, and approximating an hourly consumption of 85,000 cubic feet of gas. With gas at such a very low price as obtained in Sheffield, he ventured to affirm it was much to the advantage of steel makers to use these gas-heated furnaces.

Professor Arnold, F.R.S., of the Sheffield University, who opened the exhibition, emphasized the necessity of employing apparatus of scientific precision, and said he had been enormously impressed by the furnaces which he had seen that day. He saw, indeed, in the exhibition what they had long wanted—namely, applied science. The exact registration of temperatures by reliable instruments, and the careful control of heating operations in accordance therewith, were factors which would become more and more important for the successful carrying on of the industries on which Sheffield's prosperity depended.

Mr. S. N. Brayshaw also spoke of his experience as both maker and user of furnaces for treating high-speed steel.

The exhibition will remain open for a month, and during its continuance a series of lectures is to be delivered on subjects connected with the heating application of gas. We hope to give some report of these in so far as they may be of interest to our readers.

"ART GALLERIES" IN OXFORD STREET.

By "E. S. Memoranda."

Strolling along Oxford Street the other day, I was reminded by an inviting passage-way flanked by windows displaying gas-heated appliances for bath-rooms, gas-fires, and other grates, that I had not kept a promise, made to one of the leading spirits of the Davis Gas-Stove Company, to pay a visit to the new show-rooms that the firm have opened in that famous and much-favoured shopping thoroughfare and West-end promenade. No one misses Oxford Street when in town, and time permits; and it is beloved alike by West-end habitués and the residents in ever-growing Suburbia. I have been, have seen, and am left in a state of admiration. The show-rooms are the smartest, judged by the standards of to-day, possessed by any gas-supply undertaking or manufacturing concern associated with the British gas industry. They are perfect art galleries—ground floor and sub-floor; and there must be full measure of praise for whoever conceived them, and for whoever materialized the conception. It is not for me to pronounce any opinion as to whether or not this handsome piece of enterprise is going to be a good investment for the firm, who have spared no expense in realizing their ambition to have for demonstrating their wares a place without equal, and without corresponding position—forming as it does part of the very centre of the shopping and social life of the British Isles. They are satisfied; and that is the main thing.

Throughout the premises, there is an atmosphere of entire refinement, and a general high tone about everything. The oak-panelled walls, the ceilings, the very floors, the high-class gas-fires, the mantels within which the fires nestle, the artistic gas-fittings (indirect and direct illuminating) with their silk, beaded, and other shades, speak, and make one feel these things. Is the gas-fire a monstrosity in the chaste surroundings of the apartments of the dilettanti? Proof to the contrary is here. Is gas as an illuminant in such surroundings a solecism? Here is the demonstration to the contrary. Here are seen the numerous designs of gas and other fires, which will meet every taste. Here are numerous fixed gas-lighting fittings, ornate every one, yet not two from the same mould; and the Company have them here not because they are the vendors of such fittings, but to make this permanent gas exhibition complete. Here are kitchen, hotel, water-heating appliances of several types, and all in proper settings, to show exactly what can be achieved, and how they look when so fitted. There is no crowding. Everything has its part and place in the complete design; and the setting of everything is appropriate. The fires are separated one from the other by constructive detail, in order that the visitor may confine attention to one thing at a time, and receive individual impression without having his attention diverted by neighbours equally covetous of favour. It is all excellent and pleasing. The temptation was to linger. Certain it is these "art galleries" are going to be an influence for good for the industry. They have been so thus early They have raised a desire among some of those gas directors, committeemen, and managers who have already inspected them to incorporate similar ideas, on perhaps a somewhat modified scale, in improving the attractions of their own show-rooms. This is good. There is, fortunately for everybody concerned, a slipping away now from those old, dreary, tightly-stuffed show-rooms (some of them little better than museums) of a past day, where no one could see what he wanted under conditions fairly demonstrating appearance and efficiency. What has been will not do for the future. The best that can be done under refined conditions is what has to be demonstrated; it is easy enough to quote for, and to execute, something of an inferior order. People know this without the telling, or having it forced within the range of their vision by set demonstration. People, too, are pleased with the opportunity of having demonstration of articles combining utility, choice exterior, and efficiency without being asked to purchase or to leave an order. Everyone, printed announcements informed me, is at liberty to visit these "art galleries" in Oxford Street without being urged to buy, or even to promise an order. Those who see will not forget their impressions when next they are distributing their patronage in any of the lines in which the firm specialize.

Pleased with my visit, I congratulate the Davis Gas-Stove Company on their enterprise, and hope for them the reward that such enterprise deserves. Such reward means an enduring display in Oxford Street, and such display there must be a continuous benefit to the gas industry.

GAS FOR FURNACE WORK.

The History of an Invention.

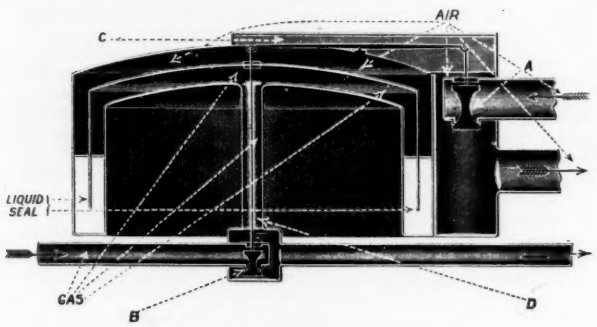
At the present time, gas may be seen being employed industrially in many places which would have been extremely unlikely for such a purpose only a very short while ago. But even now, if a search were being made for appliances beyond the domestic range for the utilization of gas, the seeker would hardly think of looking in a residential spot of the character of Porchester Terrace, W. Yet it is possible to find, and in thorough working order, within a very few feet of this thoroughfare, in the heart of fashionable London, gas-furnaces for industrial uses. It should be added, however, that the furnaces are not there for the carrying on of practical manufacturing operations. They have been erected for experimental and demonstration purposes in the laboratory of their inventor, who is only too willing to show them to anyone interested either in the sale or consumption of gas. Personal investigation of his claims is what he is most anxious to secure; and, while saying this, it may be added that, even if a trial installation of furnaces is not straightaway decided upon, inquirers may be sure of spending an interesting hour or two with Mr. A. C. Ionides, jun., of 34, Porchester Terrace, whose system it is that they will then have made clear to them.

This was the case with the writer, who, in the course of an interview a few days ago, had explained to him the different stages through which the invention has passed to its present position. Strangely enough, it was not while working with coal gas that the problems first of all presented themselves to Mr. Ionides which he has since spent several years in patiently solving. It was an experiment with a mixture of petrol vapour and air which originally set his mind to work. This experiment was made with a silica test tube, fixed vertically, and closed-in at the top. Into this was introduced another thin silica tube, from the end of which a flame was issuing; the lower end being connected to an india-rubber tube supplying a mixture of 2 per cent. petrol vapour and 98 per cent. air. This flame, it was found, continued to burn indefinitely, inside the top closed-in end of the outer vertical tube; and even when the lower end of the tube was closed-up by a washer, there was no apparent alteration of the flame. In an experimental furnace, a trial was made of this principle of burning a self-supporting gas and removing the bye-products by downward displacement; and then attention was devoted to the application of the discovery to coal gas, a matter that presented more than one problem.

In the first place, to prevent the possibility (where the mixture travels through any length of pipe) of flashing-back of the flame, owing to accidental reduction of the pressure, a baffle of special form was devised for insertion in the supply-pipe; and this proved successful in overcoming the first problem. A far more difficult question, however, presented itself in the creation of means whereby, whatever might be the variation of pressures of the two gases supplied, and whatever might be the variation in the quantity consumed, the pressures of the two should remain constant. Some such device as this appeared to Mr. Ionides to be an im-

perative necessity, because such an explosive mixture could never be safely stored, and so should be made as used.

After much labour, the difficulty was solved in the manner indicated by the accompanying diagram. In this, A and B are double-beat valves; and after the air has passed the valve A, the static pressure of the air is allowed, by means of the bye-pass C, to affect a sensitive bell; whereas the static pressure of the gas, after it has passed the valve B, influences the bell in the upward direction through the bye-pass D. Thus, when the pressure through C increases, the valve A closes; and the valve B opens simultaneously. And similarly, when the pressure at D increases, the valve B closes, and the valve A opens simultaneously. If at any point in the gas or air main gas or air should from any cause be drawn off, the two valves will at once come into operation; the result being that at every point of the two mains gas and air can, after they have passed the valves, be tapped at pressures that are equal to one another. The bell is sensitive to 1-500th of an inch of water pressure. It will be noticed that there are two points of cardinal importance about this arrangement. The first of these has reference to the automatic regulation, by which the mixture is kept absolutely constant without attention being needed; and the second is the factor of safety secured by the similar automatic cutting-off of the gas should the air supply be interrupted, and *vice versâ*, which means that if anything goes wrong with either, the whole apparatus shuts down.



Cross-Section of the Pressure-Balance.

Having thus secured conditions under which he was able to supply the desired mixture in a practical and thoroughly satisfactory manner, Mr. Ionides naturally turned his attention towards ascertaining what he could do with it. He has secured gratifying results in the matter of incandescent lighting, and has also experimented with the heating of water—to mention two directions in which his activities have led him. But for the present reference may be confined to the utilization of the system for metal-melting purposes. To the furnace in use at the laboratory the gas is supplied at its normal pressure; and a small blower is used for the air. The provision of such a blower is, of course, not a serious matter for a factory, where there is invariably power of one kind or another available; and the other adjunct to the system—the pressure-balancer—is a compact arrangement requiring a very small amount of space for its accommodation. There is no flue, as usually understood, to the furnace, but merely some 8 feet of pipe led off from the bottom; and through this pipe the products pass away—at, it is stated, a temperature of 100° C., or less. In a new form of furnace now under construction, it may be parenthetically remarked, it is intended to try and secure still greater advantage by a re-arrangement of this outlet-pipe.

As to the furnace seen at work, in addition to the absence of need for attention—except so far as the contents of the crucible are concerned—it is (when the top is covered over) absolutely free from noise; and the temperature obtainable with it is amply sufficient for the melting of brass, annealing, and operations of a similar character. The mixture, on the occasion of the visit, was being supplied to the furnace at a pressure of 2·7 inches; and, starting cold, in a 20-lb. crucible, a charge of 4 lbs. of brass was melted with a consumption of 33 cubic feet of gas. A second run immediately afterwards showed a consumption of 9 cubic feet for melting 3 lbs. of metal, or 3 cubic feet per pound, and this with frequent uncovering for examination of the charge. In proof of the fact that when the crucible is fully charged Mr. Ionides is able to secure still more economical results than these, he drew attention to the accompanying statement of tests carried out with his 20-lb. furnace. These tests were made on different dates; and since securing the results set forth, he states that second heats have varied from 1·4 to 1·8 cubic feet per pound of 70/30 brass melted, according to the quality of gas supplied.

Approximate Capacity, of Crucible.	Weight of Metal Melted.	Time Taken to Melt, in Minutes.	Gas Consumed in Cubic Feet.	Cubic Feet of Gas Consumed per lb. of Brass Melted, 1st Heat.	Cubic Feet of Gas Consumed per lb. of Brass Melted, 2nd Heat.	
13 lbs.	12·62	32·5	66	5·2		From cold 1st heat
,,	,,	20	29·7		2·35	2nd heat, 1st 20 m.
,,	12·2	15	28·5		2·31	,, ,, ,,
25 lbs.	12·75	25	47·5	3·72		1st heat
20 lbs.	19	24·5	64·2	3·39		1st heat
,,	20	19	36		1·8	2nd heat, 1st 20 m.
,,	20·6	21	32		1·55	,, ,, ,,
,,	20·7		59	2·9		1st heat (metal inserted after 15 m.)
,,	21	25	30·5		1·45	2nd heat

Later on, no doubt, the system will be tried in connection with high-pressure work; but meanwhile, on the basis solely of what has already been actually accomplished, Mr. Ionides feels that he is justified in bringing his invention to the notice of gas engineers as one which is worthy of their careful consideration. He is convinced that he is able to offer them an industrial gas-consuming appliance which shall be both economical in working cost and efficient in operation; and it is for this reason that he is desirous of getting as many as possible of those who are interested in the gas industry to visit the laboratory and make a personal investigation of his process.

WORKMEN'S COMPENSATION CASES.*

When reviewing the volume of "Butterworth's Workmen's Compensation Cases" for 1913 [see "Journal" Vol. CXXV., p. 221], it was noted that, for the first time, insurance cases had been included in the reports of cases decided under the Workmen's Compensation Acts. Our comment upon this was that there was every reason to agree with the learned authors in their inclusion of cases decided under Part I. of the National Insurance Act, 1911, because, inevitably, there is overlapping between the Compensation and Insurance Acts. This overlapping, by the way, we understand is the subject-matter for a Departmental Committee to inquire into. At the same time, we expressed the view that there did not appear to be any reason, either legal or practical, why general insurance cases, such as marine and others, should be included in the reports of workmen's cases.

Vol. VII. of the series, now under review, has gone back to the older practice; and there are no insurance cases at all reported in it. As to the elimination of the general insurance cases, it need not be repeated that we agree with the exclusion of them; but as regards national insurance reports, we think their inclusion in these volumes is of great utility. The overlapping to which we refer is shown by reference to some reports that are recorded. For instance, in *Barnes v. Evans and Co.* (p. 24), the usual difficulty arose as to whether the injured workman was under a contract of service or an independent contractor. A contract of service, it will be remembered, is the basis of the question as to whether persons are under the National Insurance Acts or not. In this case a journeyman slater had agreed in writing with builders to do some slating work at a fixed price; the slater finding his own labour. The work progressed slowly, and the builders sent additional men to push on the work. The journeyman slater fell from the roof and was killed. The County Court Judge found that originally there had been an independent contract, but that it had been turned into a contract of service at the time when the additional men had been sent to the job. He therefore awarded the widow compensation. This decision was reversed by the Court of Appeal, which held that the contract had been of an independent nature throughout. The deceased man's National Health Insurance card had been stamped by the builders; and this fact was relied upon to show that he was their servant. In the judgment, it was said "probably that was done merely because it was thought more convenient to do so than risk any question being raised in the future with reference to the card not being stamped." Some similar cases occur which show the co-relation between the questions that arise for decision under these separate pieces of industrial legislation.

A case to which it may be useful to draw the attention of gas engineers is that of *Lloyd v. Midland Railway Company* (p. 72). It raised the question of "concurrent contracts of service," and what were the average weekly earnings to be taken into consideration in compensation where the earnings from the main occupation are increased by those from subsidiary spare-time work. The workman was engaged in the day as a plate-layer; his hours being from 6 a.m. to 5.30 p.m., for which he received 21s. per week. One of the conditions in the rules book of the Railway Company was that "All persons employed by the Company must devote themselves exclusively to the Company's service. . . ." This man, unknown to the Company, was employed at a local theatre in the evenings, for which he received 7s. per week. He was injured on the line, claimed compensation, which the County Court Judge awarded to him on the basis of his average weekly earnings—not of 21s. per week, but of 28s. per week; the reason being that there was a concurrent contract of service. This decision was upheld by the Court of Appeal. This case, as has been said, may prove instructive to gas undertakings where there

* "Butterworth's Workmen's Compensation Cases," Vol. VII. (New Series), containing reports of every case decided under the Workmen's Compensation Acts during the period October, 1913, to October, 1914. Edited by His Honour Judge Ruegg, K.C., and Mr. Douglas Knocker, of the Middle Temple and South-Eastern Circuit, Barrister-at-Law, M.B. (Lond.), &c., assisted by Mr. Edgar T. Dale, Barrister-at-Law. London: Butterworth and Co.; 1914.

are numbers of men who are in part-time employment, and who may, unknown to their employers, enter into concurrent contracts of service. It is to be noted that the view of the Court was that the rule referred to only means this—that all persons employed must, while they are doing the work for which they are engaged, devote themselves exclusively to that work.

There are several other interesting cases in this 1000 page book of reports to which reference might be made; and a great deal of legal knowledge is still being expended upon the interpretation of the apparently simple phrase "injury by accident." This is an illustration of the well-known fact that the simplest phrases and the simplest questions are sometimes the most difficult to construe and answer. A case that excited some interest at the time is *Trim Joint District School v. Kelly* (p. 274), which, it may be remembered, concerned an assistant schoolmaster in an industrial school in Ireland who, having incurred the enmity of some of the boys, was assaulted by them and died through the effect of the injuries. The House of Lords upheld that the death was due to an accident that arose out of the employment.

Another case to show what may be "injury by accident" is that of *Brown v. John Watson, Limited* (p. 259), where, in consequence of a breakdown in colliery machinery, a man, kept waiting at the foot of a shaft and exposed to a cold draught which resulted in a chill and death from pneumonia, was held to have met his death as the result of "injury by accident."

Nothing more need be said to show that this excellent series of "Workmen's Compensation Reports" is full of practical guidance for employers, and also has much in it of general human interest.

THE RARE EARTHS.*

THE study of the rare earths presents considerable difficulty, owing to the similarity of the elements constituting this group. It is probably for this reason that, during the ordinary college training of chemists, little attention is devoted to this province of inorganic chemistry. Yet the scientific examination of the rare earths has been so stimulated by the technical development of the incandescent mantle that ordered and accurate knowledge is now beginning to replace the uncertain data collected by earlier investigators. It is to be regretted that these researches—and specially those directed towards the application of rare earths to the incandescent mantle industry—have been conducted to a large extent on the Continent, and thus the most authentic treatises and dissertations are written in a foreign language.

Sir William Crookes, in an introduction to the present work, emphasizes the need for a treatise in the English language dealing historically and descriptively with these rare substances, and congratulates Mr. Levy upon having successfully achieved an important and useful piece of work. The author sets out to give a general, but fairly comprehensive, account of the rare earth group. The subject is treated primarily from the chemical aspect; but as considerable quantities of monazite occur within the British Empire, and in view of the possibility that in the near future the Brazilian fields will not remain the sole source of thorium nitrate, stress is laid on the technical aspect of the question, which is carefully developed as regards the production of monazite and the incandescent mantle industry.

In 1825, Berzelius observed that thoria and zirconia when heated in a non-luminous flame emit an intense white light; and from that time until 1891, which marks the introduction of the final "Auer" mixture, and which is in use at the present day, many unsuccessful attempts to produce a practical mantle are chronicled. It is well known that the mantle now consists of a mixture of thoria and ceria in the proportion of 99 to 1, together with about 0·5 per cent. of an oxide, the function of which is to strengthen the skeleton of the ash. Beryllium, zirconium, magnesium, and aluminium oxides will serve this purpose, though for ramie fabrics, beryllia is usually chosen.

It is interesting to learn that the discovery of the thoria-ceria mixture appears to have been due to the examination of a quantity of impure thoria. It was found that mantles made from this specimen give a light which steadily decreased in intensity as the impurities were removed. It needed only the observation that the impurities consisted chiefly of cerium compounds to turn the long and arduous investigation of Von Welsbach and his assistants in the direction of final success.

The extraction of the thorium compounds from monazite is a process of great technical difficulty. Moreover, the percentage of thorium is small, while that of cerium is high. Perhaps in no branch of science is so much secrecy observed as in the working up of monazite sand for the extraction of its light-giving constituents; and we cannot expect Mr. Levy to unravel the manufacturing secrets which have been, and are still, so carefully guarded. He does, however, very lucidly describe the general methods of procedure.

Although the subject is treated essentially from the chemical standpoint, this treatise will prove of particular interest to students and workers of the gas industry. Especially is this the case in the third part of the book, which deals in an admirable manner with the technical development of the incandescent mantle.

* "The Rare Earths: Their Occurrence, Chemistry, and Technology." By S. I. Levy, B.A. (Cantab.), B.Sc. (Lond.), A.I.C., late Hutchinson Research Student of St. John's College, Cambridge. London: Edward Arnold; 1915. Price, in the United Kingdom, 10s. 6d. net.

SCIENCE IN DEVELOPING GAS HEATING.

At the Annual General Meeting of the Institution of Heating and Ventilating Engineers last Tuesday, under the presidency of Mr. H. H. GRUNDY, it was announced that, under the direction of Mr. A. H. Barker, at the University College, Gower Street, research work is being carried on, and the results will shortly be made known, with regard to the distribution of radiant heat from various heaters such as gas-stoves, coal-fires, and electric fires. Other research work concerns the distribution of temperatures in radiators, and the loss of heat under various conditions of fires and different methods of connections of pipes to the radiators. In these experiments, Mr. Barker's radiant heat thermometer is being made use of.

Mr. W. R. TWIGG, of the Davis Gas-Stove Company, Limited, subsequently read a paper on

SCIENCE IN THE DEVELOPMENT OF GAS HEATING.

In introducing his subject, the author said he had had one or two opportunities of becoming familiar with the work which Mr. Barker was carrying on at the University College, which was of an exceedingly interesting character; and it was at Mr. Barker's request that he had prepared the paper. His hope was that it would eradicate any idea that might exist in the minds of the members of the Institution that gas apparatus was "chucked" together by ironfounders. This was by no means the case now, though it might have been in the past. Since then, however, gas engineers had gone very deeply indeed into the question, and the present-day gas-stove was the result of scientific methods. He was quite sure that the research which was now being carried out under the auspices of the Institution would repay the members, as similar work had repaid manufacturers of gas-ovens. He then proceeded with his paper, from which the following are extracts.

PREFATORY.

In these progressive times the manufacturer of gas-heating appliances has found it necessary to call science to his aid in keeping the development of his industry abreast of the times; but, unlike many manufacturers, he has been ready and only too willing to do so, as he fully realized the many advantages to be obtained from a healthy co-operation of scientific investigation with practical experience. As the result of this progressive spirit, the manufacturer has now at his disposal an ever-growing range of specialized appliances which provide him with a good understanding of the principles underlying gas heating, and enable him to give an exact value to any modification that he may make in any appliance, and to compare the practical and scientific values of various appliances. The writer has been led to the conclusion that some of the instruments may be of use in the development of other branches of heating, and therefore of interest to the members of the Institution; and he offers this as his justification for introducing the subject.

The most important gas-heating appliance of to-day is without doubt the gas-fire; and it is chiefly with the instruments used in its development and testing that it is proposed to deal in this paper. The gas-fire is by no means a recent introduction; and, like many other appliances, that of early date was designed without reference to science, and without much appreciation of the principles underlying its working. As a result, it was destined to undergo many radical alterations to eliminate defects that a more complete knowledge revealed, and which it is now proposed to enumerate.

A gas-fire, and most other heating appliances, must be considered from the dual view-point of heating and hygienic efficiency, which must be developed together if a wholly satisfactory article is to be produced; and due consideration must clearly be given to the various requirements of both heating and ventilation. In the early types of fires placed upon the market, quite a small percentage of the heat available from the gas burnt was converted and projected into the room as radiant energy; and had the fire depended entirely upon radiation for its heating, it would have been extremely inefficient, and have found little or no place as a commercial article. To increase its heating efficiency, means had to be provided whereby the small amount of radiant energy available was augmented by convection currents of heated air. With this object in view, heating chambers of many forms were devised, usually situated in the head of the stove. These heating chambers offered very decided resistance to the passage of the products of combustion to the flue outlet. Also there appears to have been a fear that the provision of a large-sized flue outlet would result in the loss of a great amount of heat by way of the outlet. The joint results of these and other defects in construction was that, unless aided by a very strong chimney draught acting upon the flue outlet, some products of combustion would escape from the fire, not by way of the flue to the chimney, but beneath the fire canopy into the room heated; the amount of escape depending mainly upon the construction of the fire and the draught acting upon its flue outlet. Upon the effect of these escaping products little need be said, except that they helped to build-up the prejudice which must be admitted at one time was deservedly felt against gas-fires, but which quite undeservedly prevails in many minds to-day.

Faced with such defects, the gas-stove manufacturer quickly realized that his difficulties could not be readily overcome except

by a more complete knowledge of the science of his apparatus; and, as already stated, he has not refrained from calling to his aid the very best known methods and appliances. A survey of the defects previously mentioned will lead one to the conclusion that the first necessity was the production of a fire with a very much greater radiant efficiency—thus rendering possible the elimination of the heating chambers, productive of so many bad influences. To this end much time, thought, and money have been devoted, which happily have been fully justified by the results obtained. For a time the very great importance of hygienic efficiency was not fully appreciated. But during the last few years this point has received the closest attention from gas-stove manufacturers, and is to-day one of the strongest points, if not the strongest, of the modern gas-fire.

Early Investigations.

Probably the first serious investigation as to the efficiency and general status of the gas-fire was carried out by the Coal Smoke Abatement Society, the technical work being in the hands of Dr. Owens, Assoc.M.Inst.C.E., working under the superintendence of Dr. H. A. Des Vœux. In these tests the Gas Light and Coke Company were able to be of considerable service to the Society; and valuable aid was rendered by Sir H. Tanner in providing a suitable place for the tests to be carried out. The result of the work done between May 5 and June 6, 1906, was published in detail in the "Lancet" of Nov. 17, 1906; and it contains some extremely interesting and instructive reading. In all, about 25 gas-stoves of different types and different makes were tested. A complete survey of the results would, I regret, not produce a very satisfactory impression upon the mind of an up-to-date heating engineer. In these tests no effort was made to determine the radiant efficiency of the fire; but the work was carried out under practical conditions, and the heating effect produced taken as an indication of the relative efficiencies of the various fires. Members more particularly interested in this subject are referred to the "Lancet."

The next work on this subject that the writer is acquainted with is that of Mr. J. H. Brearley, the Engineer and Manager of the Longwood Gas Company, who read a paper to the Institution of Gas Engineers in June, 1907, upon the testing and hygienic efficiency of gas-fires. [Some of the methods and appliances used by Mr. Brearley were described and illustrated by the author.] Mr. Brearley's paper was received with the interest and appreciation that it most decidedly deserved, and, in the writer's opinion, did a great deal to stimulate gas-stove makers to really earnest efforts to construct gas-fires on sound scientific principles.

These investigations brought about a decided interest in the matter of gas-fire efficiencies, and, at a later date, a Committee was appointed by the Institution of Gas Engineers, known as the Gas-Heating Research Committee, who, carrying out their researches at Leeds University, devised what is known as the Leeds test for radiant efficiency of gas-fires. [This test was described and illustrated at some length.] In their report, issued in June, 1909, the Committee gave the results of the tests they had carried out up to that date, and a further report was issued in the same month of the following year, when it was found that the radiant efficiency of a good fire was about 42 per cent. But many fires at that date gave results considerably below 40 per cent., which latter would then have been considered a good figure. It was shown also that, by varying the chemical composition of the material used for the refractory mantles, the radiant efficiency could be increased, and a result as high as 48·5 per cent. was in one case obtained. Tests were also reported that clearly indicate the importance of correct regulation of the gas consumption and flame shape, as a result of which great trouble is now gone to by gas-fire makers to provide effective means for simple but complete regulation of the gas and air supplies to a gas-fire burner.

Other Investigators' Work.

While the Committee were carrying out these investigations, the writer's attention was actively directed to the question of gas-fire testing; he being engaged designing an installation for this purpose in the Davis Gas-Stove Company's laboratories at Luton. This test has now been in operation since 1910, and has continuously given entire satisfaction; being in regular daily use for testing and checking the accuracy of the works products. In this test no attempt is made to determine the total radiation thrown forward from a gas-fire, but rather a constant proportion of the whole, missing only those rays that are of least value when the fire is fitted and working under household conditions. [The author described in detail the radiometer referred to.]

Mr. J. G. Clark, of the technical staff of the Gas Light and Coke Company, devised and used a modified form of water-flow radiometer. Like the writer, he did not endeavour to take the total radiation incident upon a hemisphere in front of the fire under test, as is done on the Gas-Heating Research Committee's method; being of the opinion that this does not represent the actual value of the fire from the point of view of the user. Mr. Clark places both the fire and the radiometer on the floor level, and fills in the semi-circle of 24-inch radius in front of the fire with glazed tiles, which reflect a considerable proportion of the heat shown in the Research Committee's test as downward radiation. He also purposely neglects any rays projected above the semi-cylinder, as these are all directed to the ceiling, and are of little, if any, value in practical heating.

No communication upon the subject of gas-fire testing would be complete without reference to the exhaustive and far-reaching investigations of Mr. John Bond, the Gas Engineer to the Southport Corporation, the President of the Institution of Gas Engineers. Mr. Bond was a member of the Gas-Heating Research Committee; but he has carried out independent investigations extending over a period of years. It has been the writer's good fortune to have had several opportunities of becoming acquainted with Mr. Bond's work at various stages of its development; but as these investigations are not yet completed, only brief mention can be made of them in this paper.

Mr. Bond has devised and tested various instruments for determining hemispherical radiation. In one type a water-flow radiometer is used, forming a segment of the surface of a hemispherical body such as the segment falling between two lines of longitude, the surface extending from pole to pole, at which points it is without width, gradually increasing in width as the equator is reached, where a maximum is obtained. This segment is so arranged that it can rotate around a vertical axis, which passes through the centre of the fire under test. By taking readings at a number of points around the fire, the total radiation is absorbed by a stream of water flowing through the segment. Mr. Bond finds that a factor, 1·3, is required for correcting this instrument to the Research Committee test equivalents.

Another test employed by Mr. Bond is to use a large number of thermo-junctions, arranged so that every alternate junction is exposed to receive radiation from the fire under test; the remaining cold junctions being kept at a constant temperature by suitable water-cooling arrangements. The hot junctions are arranged around a semi-circular frame revolving upon a vertical axis, and thus fall upon what may be compared with lines of longitude. By taking a series of readings on a galvanometer at various positions around the fire, after testing the thermopile against a known source of radiation, total radiation can be calculated with considerable accuracy.

Mr. Bond has also directed his attention to a horizontal test, based upon the principle of the bar photometer for testing the illuminating power of gas, &c. He determines the power of the fire in terms of some known standard; thus providing data from which total radiation can be calculated.

The writer would now call attention to one more system for determining radiant efficiencies, which is being developed in the Davis Company's laboratories at Luton. This test is also of the water-flow radiometer type, and is directly the outcome of a visit the writer paid to Mr. Bond at Southport. In this method a water-cooled segment is used—very similar to the one constructed by Mr. Bond; but in this instance, instead of taking separate readings at various positions, the segment is caused to rotate slowly round its vertical axis. A special duplex meter is used to control both the supply of gas to the fire and water to the radiometer—a definite quantity of water passing with every cubic foot of gas, and means being provided for adjusting the water flow to compensate for variations in the temperature and pressure at which the gas is measured. In such an arrangement the difference in temperature of the water entering and leaving the radiometer may be expressed either in degrees of heat or directly in heat units per cubic foot of gas passed by the meter. This latter graduation is used; but thermometers are provided for purposes of checking. [The author described the apparatus.] So far as can be stated at present, a correcting factor of 1·2 will be required with this instrument; but it is hoped to be able to introduce a permanent compensation in the meter that will give results directly comparable with the results obtained by the Gas-Heating Research Committee's methods.

A Standard of Hygienic Efficiency—The "Shadowgraph."

Hygienic efficiency is a question that has in recent times occupied a prominent place in the considerations of makers and purchasers of gas-fires alike. During a period immediately following upon the reports of the Gas-Heating Research Committee's investigations and the publication of Mr. Brearley's exhaustive paper, means of increasing both radiation and radiant efficiency seem to have almost obscured the equally important question of hygienic efficiency; and up to July, 1912, it is surprising to note that no standard of hygienic efficiency had even, to the best of the writer's knowledge, been so much as proposed. Close study of the construction of the flues, &c., of gas-fires designed up to that date revealed the fact that design of these parts was a matter more of convenience than the practical application of underlying principles with a definite object in view.

In 1910 the writer was called upon to design an entirely new series of gas-fires for the Davis Company. But, before commencing upon the work, he suggested to his Directors that not only was it necessary to work up to a specified and known standard of radiant efficiency (at that time 50 per cent. minimum), but also that a standard of hygienic efficiency should be instituted, so far as the Company's goods were concerned. The standard then advanced by the writer provided that a gas-fire, when fully heated and consuming gas at the rate at which maximum radiant efficiency is obtained, shall pass the whole of the products of combustion from the gas consumed through its flue outlet, unaided by any form of flue or chimney draught. This standard was accepted after very mature consideration; and the necessary research work was instituted to elucidate the principles underlying the operation of gas-fire flues. During these investigations some difficulty was experienced in testing to ascertain whether or not a fire complied with the standard adopted. The desirability of having a

test giving its results in such a way that convincing and recordable indications of the fire's hygienic status are obtained was fully appreciated; and, after trying various ideas, a physical test was introduced—now well known as the "Shadowgraph Test." The object of this test is to enable the investigator to observe by optic methods whether or not the gas-fire under test is allowing any of the products of combustion of the gas to escape beneath the canopy when the fire is working at maximum efficiency, unaided by any form of flue-pipe or chimney draught—thus infringing the provisions of the hygienic standard adopted. In the chemical methods hitherto used for investigating the condition of the air in the immediate vicinity of a gas-fire canopy, carbonic acid is used as the indicator of contamination. But the "Shadowgraph" method is based entirely on physical principles; water vapour being the indicator in this method of testing.

On July 30, 1912, an article appeared in the "JOURNAL OF GAS LIGHTING" giving full particulars of the hygienic standard which had been adopted by the Davis Company and of the "Shadowgraph" test which had been introduced in conjunction with this standard. The publication of these particulars gave rise to criticism, and resulted in a very lengthy discussion in the Technical Press, during which expert advice was called on both sides, and the advisability of adopting such a standard was discussed in all its bearings. Strongly as this suggestion was opposed, there was a very decided tendency among gas engineers to adopt the proposed standard. To obtain final confirmation of the attitude they had taken up, the Company brought the matter before the well-known medical journal, the "Lancet." The writer had an opportunity of discussing the proposed standard with Mr. S. Arch Vasey, their well-known expert, demonstrating the various contentions brought forward by means of the "Shadowgraph" test. It received the entire approval of the "Lancet;" Mr. Arch Vasey himself introducing yet another optical test—based, however, in this case on chemical considerations.

Not only has the standard of hygienic efficiency suggested by the writer received the approval of gas engineers and the medical profession, but the majority of gas-fire manufacturers have submitted samples of their latest production to the "Lancet," and obtained its independent testimony to the fact that, when burning, unaided by any form of chimney draught or flue-pipe, they passed the whole of their products of combustion through the flue outlet—thus, in the author's opinion, proving beyond a shadow of doubt their hygienic efficiency.

DISCUSSION.

The PRESIDENT, in proposing a hearty vote of thanks to Mr. Twigg, said this was the first time the Institution had been favoured with a paper on gas heating; and there was little doubt that the gas-stove business was an industry in itself.

Mr. A. H. BARKER said that, having had the pleasure of persuading Mr. Twigg to prepare the paper, he felt a little proud of the fact that it was one of the best that had been read before the Institution in recent years. He knew something of gas heating from the fact that he had made many experiments in his own house, and he fully agreed with Mr. Twigg that the modern gas-fire is a very different proposition indeed from the gas-fire of even ten years ago. He had one of the latter in his house, but could not get any other member of the household to stay in the room where it was, owing to complaints of headache. He had since substituted a modern fire which Mr. Twigg submitted to him for a test, and the result was totally different. The gas-fire was regarded by the heating engineer with a great deal of suspicion, which had not been difficult to understand in the past. There was no reason, however, for it to exist any longer. Reference had been made by Mr. Twigg to certain tests made by the Coal Smoke Abatement Society on gas-fires. He (Mr. Barker) had not seen the results of them, but he had hoped that they were a little better than the tests the same Society made of a large number of coal-fires about ten years ago. He did not think he had ever seen such a ridiculous farrago of nonsense as the results of those tests. Mr. Twigg had also hinted that the cheerful appearance of a gas-fire was not of scientific importance. His own view, however, was that it was of very great importance scientifically, because it was necessary to satisfy the public; and the psychological effect of any form of heating must be regarded as of the very greatest scientific importance from the manufacturer's point of view. If a man was made to think he was comfortable by a particular form of heating, this was going to be the form he would use. He congratulated Mr. Twigg on having devised a testing apparatus which, according to him, labourers could use.

Mr. J. GRAY seconded the vote of thanks, and congratulated Mr. Twigg upon the lucid way in which he had dealt with the subject.

Mr. BARKER asked Mr. Twigg if he had any idea as to the number of thermal units per hour per square foot which a gas-fire should give in the ordinary zone where a person would sit—in other words, how many thermal units per square foot per hour were required to minister to the needs of that portion of one's anatomy exposed to the air when sitting in an arm-chair with the feet on the mantelpiece.

Mr. GRAY said it would also be interesting to know the efficiency of a modern gas-fire.

Mr. W. E. TAYLER asked if Mr. Twigg could recommend any form of gas-fire that did not require a chimney.

Mr. W. NELSON HADEN, referring to the radiometer illustrated in the paper, asked what width this should bear in relation to the width of the fire, in order to obtain reliable results.

Mr. TWIGG, replying to Mr. Barker's question as to the number of British thermal units radiated on to any square foot of surface in front of a fire, said he had certain figures of results obtained in this way, but he had not yet made any tests as to what was desirable or what was the limit. In connection with gas heating, developments were taking place which, in his opinion, indicated that the limit was being approached. It was useless to have a fire so hot that a person could not sit in front of it; and experience was rather tending to show that the limit was being exceeded in this respect. Therefore, instead of concentrating the radiation on to any particular square foot of surface, we should have very seriously to consider not only the question of radiant efficiency, but, what was of more permanent importance, the question of the equal distribution of the radiation. There were fires, either on the market or in course of development, which gave most uncomfortable results. As to the question of appearance, he did not mean to infer that this was of no scientific importance. He rather meant that it was not susceptible to scientific treatment in the laboratory. In was of scientific importance, and probably more so than many people imagined from the commercial point of view; and as our knowledge of the business progressed, we should perhaps appreciate this point more fully. As to the labourer working laboratory apparatus, he should like to correct Mr. Barker a little on this point. He ought to have said that the man was "almost" a labourer. The men they selected for this work were more or less intelligent; and they were educated so that, by reducing the amount of observation they had to do, and giving the more important work to others, it had been possible to dispense with the necessity for having a highly-trained operator. Mr. Gray had mentioned the efficiency of the gas-fire. Considered from the point of view of radiant heat only, the figure could be given as 60 per cent. There was also a small percentage given off in the form of low-temperature convection currents from the body of the stove, which added somewhat to the efficiency; and it could be safely said that the modern gas-fire would give a total efficiency of from 70 to 80 per cent. They varied slightly, owing not only to construction, but also to the method in which they were fixed, and also to the peculiar conditions of the gas supplied. The efficiency he had mentioned, however, had been fairly well established by Mr. Butterfield in a series of independent tests. In reply to Mr. Tayler, unfortunately he was not in a position to mention any gas-fire which he could recommend for use without a chimney. These fires were expressly constructed for use with some means for conveying away the products of combustion. They were designed primarily for use in living-rooms in which the ventilation was not excessive; and he would not feel at all safe in advocating any kind of gas-fire being used without a flue. As to the relationship of the width of the radiometer to that of the fire, which was an important point, his experiments had shown that with the radiometer 2·5 times the width of the fire reliable results were obtained. The radiometer illustrated in the paper had been designed for dealing with one size of stove only; and the results obtained from it were capable of application to larger and smaller sizes with every satisfaction.

COKE-OVEN GAS FOR BOILERS.

Terbeck Furnaces.

In the course of the article headed "Event and Comment," in the issue of the "JOURNAL" for the 26th ult., reference was made to the fact that, at their power station at Barugh, the Yorkshire Electric Power Company are utilizing coke-oven gas for boiler-firing purposes. Power Gas Economy, Limited, have since forwarded the subjoined results of a test made shortly after the plant was lighted-up; and from these readers will gather what was found to be the effect of the combustion of coke-oven gas in Stirling boilers by means of Terbeck burners.

Two outfits of Terbeck furnaces were supplied by Power Gas Economy, Limited, for two large Stirling boilers having a heating surface of 6000 square feet, working at a pressure of 185 lbs., and superheating the steam by 150° Fahr. The boilers are arranged for alternate hand-firing; and as Power Gas Economy offered a guarantee of 85 per cent. efficiency without the use of any economizer, these were dispensed with. Special care was taken that the brick-settings were made as substantial as possible; and great attention was paid to the exclusion of false air. When the plant was ordered, it was the intention to supply the gas under a constant pressure of 3 inches. For this purpose, a governor was arranged; but it was found later that the type chosen was not suitable for local conditions, and the tests were run without the assistance of the governor. It was for this reason that the gas pressure obtained was a varying one; and it is urged that still more favourable results would doubtless have been obtained had it been possible to supply the gas under a constant pressure.

The tables show that, while evaporating in excess of 5 lbs. of steam per square foot of heating surface, it was possible to pass the waste gases into the stack at a temperature of 460° Fahr., or more than 100° Fahr. below the steam temperature. As the content of CO_2 was on an average 7·8 per cent., the loss through waste heat was between 9 and 10 per cent. The only other loss was the radiation loss; but the temperature in the boiler-house showed

Evaporation Test on No. 2 Boiler.

Time p.m.	Load.	Steam Pressure.	Steam Temp. Superheated.	Steam Temp. Saturated.	Degrees Superheated.	Gas Pressure. Colliery Side of Governor.	Gas Pressure. Boiler Side of Governor.	Gas Pressure. No. 2 Header.	No. of Burners on.	Temp. of Feed Water.	Temp. of Boiler House.	Height of Water in Gauge Glass.	Position of Damper.	Draft. Front.	Draft. Back.	Temp. of Flue Gases.	CO_2.
	Kw.	Lbs.	°F.	°F.	°F.	Ins.	Ins.	Ins.		°F.	°F.	Ins.		Ins.	Ins.	°F.	%
3.30	1606	142	540	366	174	3	3	2.6	13	125	40	4½	Full	0 8	0·9	460	..
3.45	..	132	570	352	218	3	3	2·6	13	130	40	..	..	0·8	0·9	460	..
4.0	1621	160	590	360	230	3	3·2	2·8	13	133	41	..	..	0·8	0·9	460	7·8
4.15	..	165	572	363	209	3·3	3·3	3·0	13	130	41	..	..	0·75	0·9	475	8·0
4.30	1730	165	580	363	217	3·2	3·2	2·9	13	130	39	..	..	0·75	0·9	475	7·7
4.45	..	170	580	362	218	3·3	3·3	2·9	13	131	39	..	..	0·75	0·9	475	..
5.0	1707	173	575	362	213	3·1	3·0	2·8	13	134	39	..	..	0·8	0·9	470	..
5.15	..	165	572	363	209	2·8	2·8	2·6	13	135	40	..	..	0·8	0·9	470	7·5
5.30	1210	140	542	350	192	2·9	2·9	2·5	13	135	40	..	¼	0·4	0·4	440	9·0
5.45	..	160	575	362	213	2·9	2·9	2·7	13	127	41	..	¼	0·4	0·4	440	..
6.0	1210	160	555	363	192	2 4	2·3	2 0	13	127	41	..	½	0·6	0·75	440	..
6.15	..	165	563	366	197	2·0	1·9	1·2	13	128	41	..	½	0 65	0·75	460	..
6.30	1235	165	546	366	180	3·0	2·0	2·0	13	127	43	..	½	0·65	0·75	460	..
6.45	..	165	550	368	182	3·0	2·0	2·0	13	127	42	..	½	0·65	0·75	460	7·5
7.0	1322	170	561	370	191	3·0	2·0	2·2	13	127	39	..	¼	0·5	0·6	440	8·0
7.15	..	155	550	365	185	2·9	2·9	2·4	13	127	42	..	Full	0·8	0·9	470	6·8
7.30	1338	165	570	366	204	3·0	3·0	2·7	13	128	40	..	½	0·65	0·75	460	..

that little heat had been radiated from the boilers to the atmosphere. Assuming the radiation loss in the case of the Yorkshire waste-heat boilers at 2 per cent., the actual efficiency of the boiler plant, while working at a very high load, would work out at the unusually high figure of 88 per cent.

Evaporation Test on No. 2 Boiler. Summary of Results arranged Hourly.

Duration, o'clock . p.m.	3.30 to 4.30	4.30 to 5.30	5.30 to 6.30	6.30 to 7.30	3.30 to 7.30
Steam pressure . Lbs. per sq. in.	150	168	156	164	160
Steam temperature (superheated) . . . . . °F.	568	577	557	555	564
Steam temperature (saturated) . . . . . °F.	360	362	360	367	362
Degrees superheat . . °F.	208	215	197	188	202
Temperature of feed water °F.	130	132	129	127	130
Temperature of products of combustion at back end of boiler . . . . . °F.	466	472	440	460	460
Temperature of boiler house °F.	40	39	41	41	40
Gas pressure at boiler header Ins.	2·75	2·8	2·2	2·25	2·5
Gas pressure at boiler side of governor . . . . Ins.	3·1	3·1	2·5	2·4	2·74
Gas pressure at coke-oven side of governor . . Ins.	3·1	3·1	2·55	3·0	2·92
Drop in gas pressure from coke-ovens to Barugh power station . . Ins. of water	—	—	—	—	4·5
Speed of exhauster at coke-ovens . . . . R.p.m.	72	72	72	72	72
Number of burners on . .	13	13	13	13	13
Position of damper . . .	Full open	Full open	¼ open	½ open	—
Draft, front of boiler . Ins.	0·8	0·75	0·4	0·65	—
Draft, back of boiler . Ins.	0·9	0·9	0·4	0 75	—
Actual evaporation Lbs. per hour	26,900	26,600	23,400	24,900	25,450
B.Th.U. given by boiler to 1 lb. steam	1,209	1,212	1,206	1,203	1,206
Equivalent evaporation from and at 212° F.	33,540	33,320	29,100	30,930	31,660

Professor Lewes on Motor Fuel.—At the Royal Society of Arts last night, Professor Vivian B. Lewes, F.I.C., F.C.S., delivered the first of his course of Fothergill Lectures on "Motor Fuel." He dealt with the production, properties, composition, and grades of petrol; and next Monday he will discourse on its substitutes. The points in the lectures in which "JOURNAL" readers are specially interested will be duly noticed.

Manchester District Institution of Gas Engineers.—At the annual meeting of the Institution, to be held at the Grand Hotel, Manchester, on Saturday, the 27th inst., in addition to the Presidential Address of Mr. J. G. Newbigging, two papers will be read. The first will be on the "Mechanical Transport of Coke—Comparative Efficiencies and Costs, by Mr. R. E. Gibson, of Liverpool; and the second, on the "Maintenance of Gas Apparatus," by Mr. H. Kendrick, of Stretford.

Scottish Junior Gas Association (Western District).—On Saturday members will pay a visit to the New Grange Meter Works, in Edinburgh, of Messrs. Alder and Mackay. The next two business meetings will be held in the Royal Technical College, Glasgow, on March 6 and 20 respectively. At the first Mr. David Fulton, of Helensburgh, will read a paper on "Carbonization in Vertical Retorts;" and at the second Mr. T. Carmichael's Presidential Address, dealing with "Reinforced Concrete Work in Gas-Works," will be read; and this will be followed by a paper on "Liquid Ammonia," by Mr. A. R. Muir, of Greenock.

MODERN ILLUMINATION PROBLEMS.

By V. H. Macklnney.

At a Meeting of the Institute of Sanitary Engineers, held recently in Caxton Hall, Westminster, a paper prepared by Mr. V. H. MACKINNEY, of Holophane Limited, on "Problems in Modern Illumination," was read (in the absence of the author) by Mr. E. Stroud. A number of lantern slides illustrative of the matter dealt with were thrown upon the screen.

In the opening paragraphs, it was pointed out that it is somewhat singular, seeing that such care is devoted to the natural lighting of buildings, that the provision of artificial light does not receive more care. Not infrequently when buildings are erected the artificial lighting is left to the very last, and the amount expended on it is quite out of proportion to its importance. Yet in the present age artificial light plays an important part. Great developments in illuminants during the last century have revolutionized the traffic conditions in the streets, enabling swift-moving vehicles to pass where once men moved with a sense of danger. In the olden days the disorderliness of the streets was such that people preferred to keep behind doors at night; and illumination has been one of the most powerful means of promoting the safety of the thoroughfares. From this point the author went on to refer to good illumination in connection with the care of health, good lighting as an economical necessity, and what constitutes "good lighting." On the important subject of illumination and the eye, he remarked that one can facilitate the comfortable action of the eye and reduce to a minimum temporary or permanent harmful effects, by observing the following rules in designing a lighting installation.

1.—There must be sufficient illumination so that objects are easily seen by means of the light which they reflect. Therefore more light must be thrown on dark objects than on light ones.

2.—There must not not be too much contrast of illumination. Should desks be brightly lit by means of local points, there should also be sufficient general illumination to see about the room in comfort, when one's attention is taken from the desk.

3.—Unscreened bright lights in the field of vision should be avoided.

4.—The lights should be steady. The constant attempt of the eye muscles to follow the change in brightness, if a flickering light, may result in temporary eye-strain, and adds to the trouble of carrying out fine work. This is raised as an objection to the use of gas-driven engines and engines of low periodicity for supply stations, as the pulsations are distinctly noticeable in the resultant illumination.

5.—Streaks or striations in the resultant illlumination are undesirable, owing to the attempt of the eye muscles to adapt themselves to the varying illumination. Highly-polished reflectors, which give definite images of the light sources, are, therefore, to be avoided, or used only with lamps provided with diffusing and enclosing globes. This striation effect is very objectionable when you get the light sources vibrating, as in a machine-shop, and when reading or working on paper with a shiny surface.

6.—Light sources should be properly placed, so that the light is not regularly reflected into the eye. This is particularly applicable to desk lighting and similar employments, and in conjunction with the striation effects mentioned above.

The sensation of vision is usually considered as being comprised of four elementary sensations—contour, relief, perspective, and colour. Of these, the two most important to be considered in illuminating engineering are relief and colour. Illumination with an entire absence of shadow may hinder easy vision by interfering with the perception of relief. Thus, spaces which are uniformly illuminated from a large area of light-source, usually

give an uncomfortable impression owing to this elimination of all relief. Unduly dense shadows, such as are caused by a few light-sources of high candle power and small area (high intrinsic brilliancy), are fully as misleading as an entire absence of shadow, and multiple shadows are often troublesome, as in ball games. Fortunately, it is very difficult to get absence of shadow. One could only do this by arranging a room with entirely white ceiling, walls, and floor, thus reproducing the effect of an Ulbricht sphere. Correct colour values are mainly important in certain trades. For domestic lighting, many people like the warm yellow light of the flat-flame gas-burner or the carbon lamp, which is regarded as the natural transition from the sunset. But for industries—such as silk, cloths, carpets, dyeing, tobacco, and the like—where the matching of colours is necessary, a white light, closely resembling daylight, is preferable.

Coming to the topic of globes, shades, and reflectors, Mr. Mackinney reached a field which he has made peculiarly his own. He said that useful shades can be made of transparent, diffusing, and opaque substances. The material may be metal, glass, cardboard, silk, &c. Little is known of the precise diffusing and reflecting, diffracting, and refracting properties of these various materials; and the time seems ripe for a closer study than has hitherto been the case. It is rare that either the brilliancy or the light-distribution of the illuminant are such as desired. A shade more often than not serves the two-fold purpose of modifying the brilliancy and the distribution; but as yet it is rare for the results to be predetermined on theoretical grounds in advance of manufacture. Opal is an excellent diffuser, and reflects light to a considerable degree; but its power of controlling (re-directing) the light is limited. With the present-day filament lamps, it is not possible with its aid to produce an extensive or highly concentrating distribution curve. The same remarks will apply to the new white glass shades recently introduced into this country. A frosted globe and an opal globe are by no means equivalent in their action on the distribution of the light flux. An incandescent lamp filament in an opal globe (not too dense) is clearly but faintly visible, surrounded by a brightly luminous globe; while in the case of the frosted globe the filament appears as a bright ball of light, while its outline is not visible—the globe being non-luminous, or but faintly luminous.

The fact that both good diffusion and re-direction of the light rays can be obtained with clear glass, and, consequently, for a low absorption value for the resultant globe, gives this class of material a distinctive position over other types. Clear glass diffusion is quite different from the diffusion from opal and other similar types of glass shades. In the case of the clear glass, the areas which effect the diffusion are of material size; whereas in the case of the opal, or similar glass, each minute particle of the substance produces upon one ray the effect of 180° distribution, as against the bundle of rays over a definite area in the case of the clear glass. We may term the effect that is produced "soft" and "hard" respectively. Clear glass, with correctly-designed prisms, affords a means of controlling light to the greatest extent and re-directing it more efficiently than any other known material. This fact cannot be refuted.

The following table summarizes on broad lines the properties of various materials referred to in the paper.

Material.	Its Power for—		
	Diffusing.	Reflecting.	Refracting.
Clear prismatic glass.	Good	Excellent	Excellent
Opal or white glass	Excellent	Limited	..
Sand-blasted or acid-etched glass . .	Limited	..	..
Mirrored glass.	..	Excellent	..
Silk or similar dress material . . .	Limited	Good	..
Opaque cardboard with matt-white surface	Excellent	Good	..

The main functions of a shade might perhaps be defined thus:

1.—The screening of the source of light from the eye, and avoidance of glare.

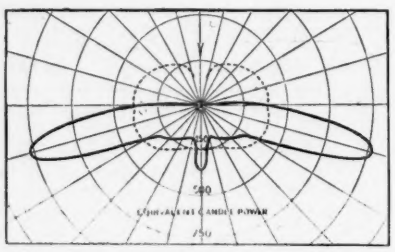
2.—The direction of the light where it is chiefly needed—*e.g.*, reduced illumination of the upper parts of the walls and ceiling, and improved illumination on the working plane.

3.—The softening and toning-down of shadows.

4.—Decorative effect.

Showing a number of curves, it was pointed out that in the case of the upright gas-burner and carbon and ordinary tungsten lamps, they give the maximum candle power in the horizontal direction, with a great diminution in the vertical axis, due to the construction of the burner or the formation of the filament. While in the case of the inverted gas-burner and the half-watt lamp, the candle power is approximately the same over the lower hemisphere. A subsequent series of curves indicated how the bare lamp distribution can be altered, and how great are the advantages to be derived, by using a suitable shade. Though the following curve relates to a half-watt lamp, it will be of interest as showing the refractive properties of prismatic glassware.

This curve is obtained from an enclosed prismatic unit, in conjunction with a 400-candle power half-watt lamp. The unit is specially designed for street lighting, and gives the maximum illumination (which maximum is 2½ times the rated maximum candle power of the lamp) at an angle of 15° from the horizontal, which angle is considered ideal for the purpose. The great advantage



.....Lamp Alone. ——Lamp with "Refractor" Lantern.

Characteristic Light Distribution Curve of "Refractor" Lantern.

of this type of distribution for street lighting is that it is possible to obtain more or less even illumination down the whole street, rather than intense light in close proximity to lamp-standards, with great diminution of illumination between them. The particular unit from which this curve was obtained is made up of two pieces of prismatic glassware, one fixed inside the other. The internal piece has a smooth interior and horizontal ribbings on the exterior, and the external piece has a smooth exterior and vertical ribbings outside. This, when fixed together, offers a smooth interior and exterior, which does away with the objection, as a dirt collector, of prismatic glassware when used in the open.

In the concluding portion of the paper, referring to the reflection value of surroundings, it was remarked that, in calculating illumination value, it is necessary to take into account the effect produced by the light reflected on to the working plane by the surrounding objects. It is quite possible to obtain an increase of as much as 80 per cent. in the illumination on a horizontal plane when the room is small, and the surroundings light. Speaking broadly, the increase in the actual illumination is as follows:—

Condition of Ceiling.	Condition of Walls.	Increase over Calculated Illumination.
		Per Cent.
Very dark	Very dark.	0
Medium	,, ...	15
,, ...	Medium	40
Very light	Very dark.	30
,, ...	Medium	55
,, ...	Very light.	80

In very large rooms, the effect of reflection from the walls would be less important, although ceiling reflection must be considered. In large spaces, however, the decreased importance of wall-reflection is to some extent counterbalanced by the effect of distant light-units; their tendency being to improve both the average intensity and the uniformity.

THE HIGH-SPEED GAS-ENGINE.

By R. Embleton, of Manchester.

[A Paper read before the Junior Institution of Engineers Feb. 8.]

Since the days when the waterwheel and the windmill held the field, many improved types of prime movers have been introduced. The steam-engine, the gas-engine, the steam-turbine, and the "Diesel" oil-engine have each in its turn threatened to annihilate the previous champion in the field. None, however, have ever been successful in entirely superseding their predecessors; and to-day we find numerous examples of each of these types of prime mover at work, and occupying a sphere of usefulness, in which, owing to inherent advantages and local circumstances, they stand pre-eminent and unassailable by any of the other types. The author intends in the present paper to describe the construction, working, and particular advantages of the high-speed gas-engine, and to define the special fields in which its merits are peculiarly valuable.

The high-speed gas-engine stands in the same relationship to the ordinary slow-speed gas-engine that the high-speed steam-engine bears to its slow-speed brother; the latter being generally of the horizontal open type and low rate of revolutions, and the former of the vertical enclosed type and the rate of revolutions high—the mean piston speed remaining the same for both types. The high rate of revolution, combined with a minimum cyclical irregularity and "close" speed regulation, makes it particularly suitable for direct coupling to electrical generators; and it is in this connection that the author intends mainly to confine his remarks.

Most of the high-speed gas-engines on the market at present, like those of the slow-speed type, operate on the four-cycle or "Otto" principle—that is, on the first stroke of the piston an explosive mixture of gas and air is drawn into the cylinder through the inlet valve. On the second stroke this mixture is compressed to from 100 to 150 lbs. per square inch, according to the nature of the gas being used. At the commencement of the third stroke, the mixture is fired by means of an electric spark generated by means of a high or low tension magneto machine, Lodge igniter, or other gear. On ignition, the pressure rises up

to from 200 to 250 lbs. per square inch, and, as the piston moves forward, the working fluid is expanded down to about 20 lbs. per square inch, exerting a mean pressure of about 70 lbs. per square inch on the piston, and forming the working or power stroke. On the fourth stroke the products of combustion are expelled through the exhaust valve.

It will be seen that, owing to the fact of there being only one working stroke in four, a very uneven turning effort is produced on the crank shaft of a single-cylinder engine in comparison with the power developed; so that a relatively very heavy fly-wheel is necessary to absorb the power in the one working stroke, spread it out over the other three strokes, and give reasonable regularity of speed.

The ordinary commercial horizontal slow-speed gas-engine has usually a stroke equal to twice the diameter of the piston, a speed of from 150 to 300 r.p.m., and has a cyclical speed variation of about $\frac{1}{35}$. That is, the variation in speed in one revolution or part of a revolution is expressed by the formula $\frac{\text{maximum—minimum,}}{\text{mean}}$ due to uneven turning moment and controlled by the fly-wheel, as distinct from speed variation due to change of load, which is controlled by the governor. This degree of variation is quite good enough for the purposes for which these engines are used—viz., the driving of factories, machines, pumps, &c., where close speed regulation is not essential. For electrical work a specially heavy fly-wheel is fitted, giving a cyclical speed variation of about $\frac{1}{50}$. This is sufficiently good for driving direct-current generators, either by direct coupling or more usually by means of belts or ropes, which further damp-out the cyclical variations. For the driving of alternating current generators in parallel, especially by means of direct coupling, a much finer cyclical regularity is necessary; and for this work the high-speed gas-engine possesses special qualifications.

In the driving of alternators in parallel, speed regulation is a very important factor, as not only must all the sets in parallel run absolutely with the same mean periodicity, but the amount of angular variation in electrical degrees in the position of the rotors one with another must be very small, or one or other of the sets will run out of phase and refuse to take its share of the load. In combination with the cyclical variation, the number of cylinders used on the engine have an important bearing on this point, and in the high-speed short-stroke engine of the three, four, or six cylinder types, the necessary conditions are easily obtainable with the use of a comparatively light fly-wheel. There are other considerations which limit the use of the single and double cylinder engines for the driving of alternators, but they are eminently suitable for direct coupling to direct-current generators.

The high-speed gas-engine has a stroke about equal to the diameter of the piston, and a speed of 250 to 500 r.p.m. Compared with a slow-speed engine of the same power, there are twice as many impulses in a given time in the single-cylinder type.

The approximate values of the various types of high-speed gas-engines as regards their cyclical and angular variations are as follows (cylinders of the same bore and stroke, and a fly-wheel of the same kinetic energy being taken in each case):—

No. of Cylinders.	Cyclical Variation.	Angular Variation.
1	$\frac{1}{100}$	1 degree
2	$\frac{1}{1250}$	·4 ,,
3	$\frac{1}{1500}$	·2 ,,
4	$\frac{1}{3000}$	·04 ,,
6	$\frac{1}{5000}$	·03 ,,

The same fly-wheel in the case of a single-cylinder slow-speed engine would give a cyclical variation of $\frac{1}{50}$, and an angular variation of 2°. The actual effects obtained in practice vary a great deal and depend upon the mean pressure used, the piston speed of the engine, and the weight of the reciprocating parts. By a suitable variation of these factors almost any form of turning-effort curve can be produced, and the author would specially draw attention to the remarkable results that can be obtained by the four-cylinder combination, where the curve can be made to follow very closely to the mean line. With a cyclical variation of $\frac{1}{500}$ and an angular variation of ·04°, it compares very favourably with the compound or even the triple expansion steam-engines used for a similar class of work. In the six-cylinder type the two extra cylinders are added merely to obtain additional power, and are not justified by any improved speed regularity. The valuable modifying effects of inertia and the influence of the sequence of the power impulses combine to give a minimum speed variation; and in actual practice the amount is so small that it cannot be detected by any flicker in the lights or by any of the ordinary electrical instruments.

As regards the amount of speed variation due to change of load, this can be kept within very narrow limits, usually about 2½ per cent. from no load to full load "settled" variation, with a momentary variation of 6 per cent. all off to all on. This is controlled by a governor mounted on the end of the crank-shaft, acting on a throttle valve, which controls either the quantity or the quality of the mixture passing to the cylinders; the particular method adopted varying with the nature of the gas used.

So far the author has endeavoured to show that, as regards regularity of speed, the high-speed gas-engine is particularly suitable for generator driving. This, however, is not the only qualification necessary. Especially in central station work, the engine must be absolutely reliable, and able to generate its rated power for long periods without breakdown.

The high-speed gas-engine is designed to give its rated power with the comparatively low mean pressure of about 70 lbs. per square inch and an initial explosion pressure of about 250 lbs.—not much higher than that used in a modern steam-engine. Consequently, it is able to run for long periods without trouble from overheating or undue fatigue of the working parts, and, if necessary, is capable of dealing with overloads up to about 15 per cent. for short periods.

These engines are fitted with a forced lubrication system to all working parts, so there is no reason why they should not run continuously with very little attention. As a matter of fact, there are a large number at work running continuously day and night, with only one short stop at the week-end. In case of breakdown—to which any machinery is liable through bad material or workmanship—all parts are easily accessible. Both pistons and valves can be withdrawn through the tops of the cylinders. If a light crane or runway is fitted overhead, and a few spare parts kept in stock, damaged or broken parts can be easily and quickly replaced, and time lost through this cause reduced to a minimum. The parts most liable to wear and breakage being the piston rings, valves, springs, and ignition plugs, an assortment is usually supplied by the engine makers; but in any case they are not costly items to replace.

To maintain these engines in operation it is only necessary to keep them supplied with gas. For small powers this can be obtained from the town's supply; and even for the larger powers this source is preferable in districts where gas is supplied at a cheap rate for power purposes—the only accessory then required being a meter to register the quantity used. Where town gas is not available, or too expensive, producer gas is used, and generated on the premises by means of suction or other gas plants, using anthracite coal or coke. In large installations, ordinary bituminous coal is used in the Mond or other gas-plants.

A supply of gas being available, high-speed gas-engines can be started immediately by simply barring the engine to the starting position and then opening the compressed-air starting-cock—no previous warming-up being required, as in the case of the steam-engine. This quick starting is of great value in certain cases. The compressed air is supplied by a small auxiliary air-compressor, which can be driven by an electric motor if current is always available, or by a small gas, oil, or petrol engine. This auxiliary need only be run for a short time daily to charge an air-receiver to a pressure of 250 lbs. per square inch. The air is taken from the storage receiver to the starting-cock on the engine, and from there to mechanically operated valves, which admit the air automatically to the cylinders on the power strokes only. On the first revolution of the engine, mixture is drawn into the cylinders, which immediately take up their firing; the only hand operations for starting being to open the gas-cock, and open and close the starting-cock. All this is accomplished in the space of less than 10 seconds, and with a drop of pressure in air receivers of the usual capacity of less than 5 lbs. With the air-storage capacity usually supplied, about a dozen starts can be made without recharging, and where the engines are used for driving shafting, &c., they can be started with the load on if necessary.

To keep the engine cylinders at a suitable working temperature, water is forced through the jackets and covers; and a small pump driven from the engine is supplied for this purpose. From 8 to 10 gallons per brake-horse-power-hour are required, and the water can be cooled in large tanks or by means of a cooling tower, or even by a mechanical cooler in the engine-room itself, and used over and over again with very little wastage. Where a plentiful supply of water is available, it can, of course, be "run through," and the cost of cooling apparatus saved. The exhaust from these engines can be made practically noiseless by exhausting into a pit in the ground, and then carrying the gases to the top of the building by means of a large uptake pipe.

As regards the question of balance and vibration, in the single-cylinder type of gas-engine there is always a large unbalanced force due to the movement of the piston, connecting rod, &c., which can only be partially compensated for by the use of balance weights. Also the unbalanced pulsations of the air, due to the pumping action of the single piston, have their effect upon doors, windows, &c. These combine to make the presence of the engine known and felt, and are often the cause of annoyance in certain localities. In the multi-cylinder type of engine, the bulk of the unbalanced forces are eliminated; the four and six cylinder types being especially good in this respect—due to the peculiar arrangement of the cranks.

The author has now dealt with the particular suitability and reliability of the high-speed gas-engine for the driving of electric generators, the main purpose for which these engines were designed, but there are many other purposes for which its peculiar advantages make it suitable. A few of these may be stated.

For the driving of spinning and weaving machinery by means of ropes or belts, its high cyclical regularity is of great value in reducing the loss due to broken ends, particularly in fine cotton spinning. Several of these engines are used for that purpose.

For direct coupling to centrifugal pumps for sewerage, drainage, irrigation, or dock work, the ease and rapidity with which these engines can be started-up is of great advantage; particularly in installations for the prevention of floods, or in sewage works where, in the event of a sudden downpour of rain, they can be started-up immediately to deal with the flood water and relieve the main sewers. Several large installations have been put down for this purpose by the London County Council, consisting of vertical gas-engines coupled to centrifugal pumps, and using town

gas, which is always ready on tap; and as their use is only occasional, and for relatively short periods, the cost of gas does not much matter. In this case the starting air is also used for the priming ejectors of the pumps.

A fair amount of experimental work has been done in the past in connection with the use of this type of engine, in conjunction with gas-producers, for marine work. The difficulties have been mainly in connection with the reversing and the great range of speeds necessary for manœuvring. These difficulties are being gradually overcome; and at the present moment there are a fair number of small vessels being propelled by this means, giving entire satisfaction to their owners. The author believes that there is a great future for the gas-engine in this connection.

The high-speed gas-engine can also be used for almost any of the purposes that the slow-speed engine is used for; the only disadvantage being the matter of price, which is rather higher per rated horse-power than is the slow-speed type. But even this fact is largely counterbalanced by the smaller space occupied by the engine and by the smaller buildings and foundations required.

The simple type of the high-speed gas-engine is built in powers of from 50 B.H.P. in two cylinders up to 750 B.H.P. in six cylinders. Above this power they are built with a second line of cylinders mounted over the first line, tandem-wise, to a power of about 1500 B.H.P. There is very little difference in fuel economy between small and large plants; the average heat consumption at full load being at the rate of about 10,000 B.Th.U. per B.H.P. hour, with a thermal efficiency of 30 to 35 per cent. on the indicated horse-power. The best of steam sets, the author believes, can only show a thermal efficiency of half this amount.

To sum up, generally, the advantages of the high-speed gas-engine and the fields in which it can be fittingly used are as follows: It possesses all the qualifications of reliability, regularity of speed, and economy of running necessary for the driving of electric generators for lighting or power in private works, large shops, or in central station work for the public authorities of small boroughs, urban or rural districts. No boiler is required, and no unsightly stack to emit black smoke and pollute the atmosphere. The absence of vibration enables it to be installed in towns or cities without damage to surrounding property, or in urban or rural districts without annoyance to the inhabitants, while it can be installed in neat and artistic buildings, in keeping with the style of the districts. It is compact and neat in appearance; and, as it can be direct coupled to the generator, only a small floor-space is required, with buildings comparatively small for the power generated. Where town gas is used, it is self-contained, and, with the exception of the starting apparatus and circulating pump, no auxiliaries are required, and the whole plant can be housed in one building. Where a gas-plant is used, this can be covered by a cheap lean-to shed on one side of the engine-house. A very little coal goes a long way; an occasional feed with a bucket being all that is required—no laborious stoking and no constant stream of coal carts that are a necessary adjunct in connection with some steam plants.

The consumption of town gas is about 20 cubic feet per B.H.P. hour of gas of a value of 500 B.Th.U. per cubic foot, and, with gas at 1s. 8d. per 1000 cubic feet, works out to 0·4d. per B.H.P. hour, or 0·6d. per Board of Trade unit. In some towns, gas is very much cheaper than this, with a corresponding reduction in fuel cost. Where a gas-plant is used, about 1 lb. of anthracite coal per B.H.P. hour is required; this amount covering stand-by losses during short periods when the engine is not working. With anthracite at 30s. per ton, this works out to 0·16d. per B.H.P. hour., or 0·24d. per unit. In some parts of the country anthracite can be obtained at a very much less figure than 30s. All the figures are taken on a full-load basis. With an average of three-quarter load, they would be increased by about 10 per cent.

Being totally enclosed, high-speed gas-engines are clean in operation, and no oil is thrown about the engine-room. If a suitable crank-case oil is used, they are very economical in oil consumption. To give one instance—a four-cylinder engine of 300 B.H.P., working 10 hours a day, uses 3 gallons of oil per week, or 1 gallon per 100 H.P.

The question of running costs as compared with steam sets depends, of course, to a great extent upon the size of plant, type of engine and boilers—ancient or modern—and the price of coal, which varies considerably in different districts. The first installation of high-speed gas-engines with which the author was connected—installed about twelve years ago, is still running, and, he believes, giving satisfaction—will permit a fair comparison being made between the cost of gas and steam sets.

The engines in question were two four-cylinder gas-electric sets of 180-kw. capacity each, served by two gas-plants, and were installed in a station alongside of an existing steam station of exactly the same capacity, consisting of two 180-kw. triple-expansion steam sets with water-tube boilers and superheaters and surface condenser. The total initial cost of each complete set of steam plant was £3642, and the total initial cost of each set of gas-plant was £3200—a difference in favour of the gas-plant of £442. In the steam station, with coal at 16s. per ton, the total works cost was 0·875d. per unit generated. In the gas station, with coal at 18s. 6d. per ton, the total works cost was 0·552d. per unit generated. Both sets worked with a load factor of 65 per cent. It will be seen that a difference in favour of the gas set of 0·323d. per unit under practical working conditions was obtained in this particular instance with what must now be considered an out-of-date design of high-speed gas-engine.

DETERMINING THE SPECIFIC GRAVITY OF GASES AND CORRECTING THE VOLUME TO NORMAL.

The following is an abstract translation of a communication in the "Journal für Gasbeleuchtung" of the 30th ult., by Dr. M. Höfsass, an Assistant to Professor H. Bunte at the Chemical-Technical Institute of the Technical College at Carlsruhe.

Determination of Specific Gravity.

Determinations of the specific gravity of gases depend on the law of effusion. The ratio of the times of flow through a fine orifice of a given quantity of the gas and of the same quantity of air is ascertained. In Bunsen's effusion test, mercury was used as the confining medium; but in the later forms of apparatus water replaced the mercury, and for exact results allowance had to be made by calculation for the humidity of the gases. The solubility in water of some of the constituents of the gas which is being examined may give rise to error. When it is desired to check the unformity of the gas delivered from a main, &c., it is necessary with the ordinary effusion apparatus to make a series of separate determinations; and the apparatus shown in fig. 1 has been devised for connection with a gas-main in order to afford continuous control of the gas passing.

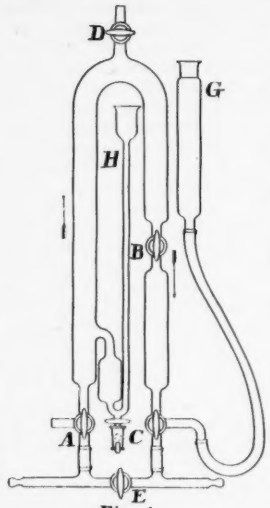


Fig 1.

This apparatus also depends on the Bunsen effusion principle. It consists of an inverted U-tube, closed by the taps A and B, and having attached to one limb the contracted pressure gauge H and at the bend the tap D, in the bore of which the effusion orifice is inserted. The ends of both limbs connect with a tube having in its middle the tap E; and this tube serves to couple-up the apparatus with a gas-main or supply-pipe.

When the apparatus is connected with a stream of gas, if the tap E is shut, and the taps A, B, and C are opened, gas flows through the apparatus in the direction of the arrows. To make a density determination, the tap E is opened and the taps A and B closed. The gas standing in the space between the taps A and B at the pressure prevailing in the main is used for the determination by allowing the volume corresponding with the excess of pressure to flow out into the atmosphere through the orifice in the tap D and observing the time in which the pressure falls between two marks on the pressure gauge. The time of the fall of the liquid in the pressure gauge between two fixed points, as observed by a stop-clock, is a measure of the density of the gas. If the pressure in the main is not sufficient to raise the liquid in the pressure gauge to the upper mark, the necessary quantity of the gas is driven from the space between the taps B and C into the space between the taps A and B of the U-tube by raising the vessel G; and the observation is then made as before.

The density of the gas relatively to air is well known to be equal to the quotient of the squares of the times of efflux of the gas and of air at the same temperature. In order to avoid the calculation involved, the following arrangement has been devised. The lower mark of the pressure gauge is movable, and is set so that the time of efflux of air is exactly one minute. The denominator in the equation $d_2 = \frac{t_2^2}{t_1^2}$ then has a constant value, and the relative densities of the different gases corresponding to their times of efflux in seconds can be calculated directly. The results of such a calculation for gases having a specific gravity between 1·00 and 1·10 are given in the scale reproduced in fig. 2. This scale shows also the square root of the density, which is required in many cases.

When the apparatus is in frequent use it must be re-set from time to time by reference to air. This re-setting may be done without stopping the flow of gas, as the taps A and B are three-way taps, and may be turned to put the apparatus in communication with the outer air. The displacement of the gas in the apparatus by air is effected by raising and lowering the levelling vessel G, which is also used to put the required pressure on the air enclosed between the taps A and B. The determination of specific gravity is then made in the usual way.

The effect of temperature on the determination of specific gravity may be entirely neglected provided the temperature remains constant within 3° to 5° C., because the change of temperature also affects the vessel D. If the fluctuations of temperature are greater, the lower mark on the pressure gauge must be re-set for air at the temperature in question.

Correction of Volume to Normal.

In work involving the measurement of a volume of gas, it is customary and even necessary to correct the volume of gas as

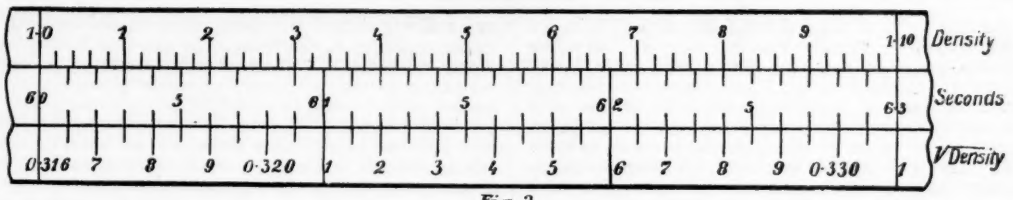


Fig 2

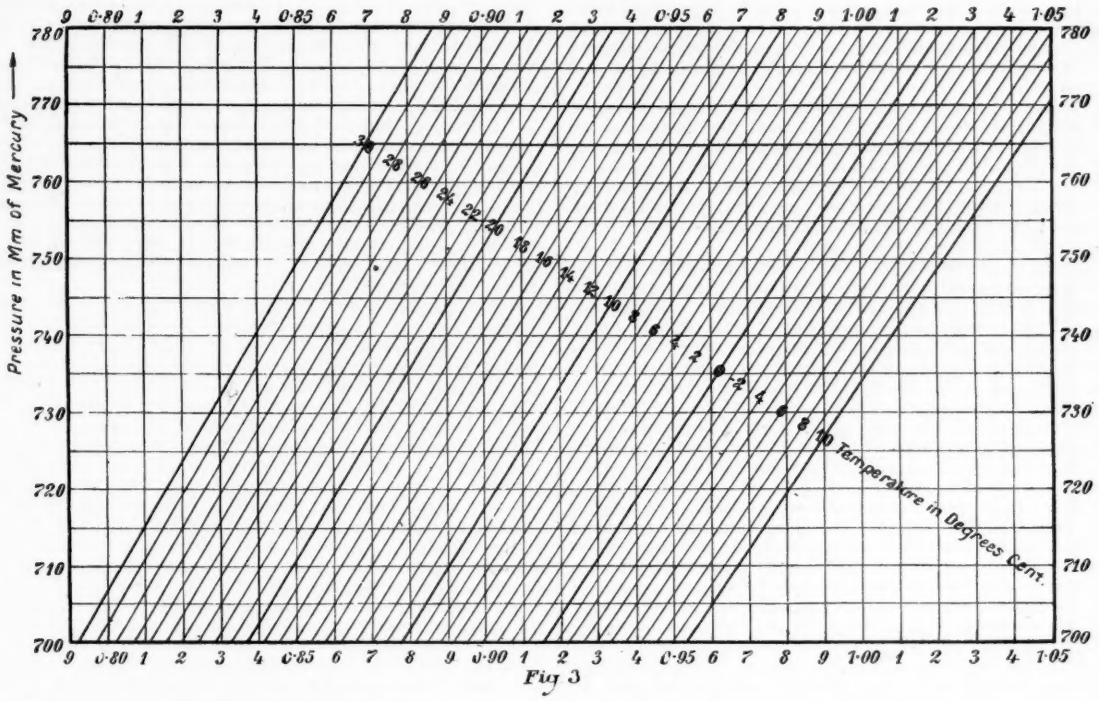


Fig 3

Dr. Hofsäss' Table for Correcting Volumes of Gas (measured saturated) and Calorific Powers to the Standard Condition of 0° Cent., 760 mm., and dry.

[*Instructions for Use.*—Follow the horizontal line corresponding with the prevailing pressure to the point where it cuts the inclined line corresponding with the observed temperature. The vertical through this point gives on the abscissæ the tabular number required, which is used as a multiplier in correcting a volume of gas, and as a divisor in correcting a calorific power.]

measured to so-called "normal" conditions, which are either, for scientific work, 0° C., 760 mm., and dry, or, for technical purposes, 15° C., 760 mm., and saturated. [The latter corresponds almost exactly with the English standard conditions of 60° Fahr., 30 inches, and saturated.] The correction is made in accordance with the Boyle-Mariotte law by the equation:—

$$Vn = \frac{Vt\,(b - w)}{760\left(1 + \frac{t}{273}\right)}$$

in which b is the pressure (in mm.), t is the temperature (in degrees Centigrade), and w is the tension of water vapour (in mm. of mercury) prevailing when the volume is measured. In order to avoid frequent repetition of the tedious calculations involved by this equation, tables have been drawn up which give the value of the factor

$$\frac{b - w}{760\left(1 + \frac{t}{273}\right)}$$

for all ordinary conditions; and it is then only necessary to multiply the observed volume by the corresponding tabular number, or factor from such a table, in order to obtain the corrected volume in normal conditions. Several such tables have been published, and latterly M. Wendriner has converted the above equation into logarithmic form; and the correction of volume is then made by merely adding three figures, of which one is taken from a table which he has calculated.

Having regard, however, to the advantages of graphic charts over tables of separate figures, the author has drawn up that reproduced in fig. 3. An example will illustrate the mode of using the curves given in this diagram.

The illuminating power of a Welsbach burner is found on the photometer to be 80 candles, the pressure in the gas-meter being 40 mm. of water, the barometric height 747 mm. of mercury, the temperature 20° C., and the observed rate of consumption 128 litres per hour. If it is required to know the corresponding consumption in litres in standard conditions (0° C., 760 mm., and dry) per candle per hour, the procedure is as follows: Since 13·6 mm. of water are equivalent to 1 mm. of mercury, 40 mm. of water pressure in the meter is equal to 3 mm. of mercury, and the gas stands under the total pressure of 747 + 3 = 750 mm. of mercury. Through the point at which the horizontal line 750 in the diagram intersects the inclined line for 20° C., the vertical line 0·897 would pass. The corrected volume of gas is therefore 128 × 0·897 = 114·8 litres, and the duty of the burner is $\frac{114{\cdot}8}{80} = 1{\cdot}435$ litres per candle per hour, or $\frac{80 \times 28{\cdot}3}{114{\cdot}8}$ = 19·75 candles per cubic foot.

The use of the diagram is therefore as follows: An observed volume of gas is corrected to normal (0° C., 760 mm., dry) by multiplying it by the factor found from the diagram; but observed calorific powers, &c., are similarly corrected by dividing by this factor.

A COUNTRY GAS-WORKS, PAST AND PRESENT.

By A. P. Dale, of Beith.

[A Paper read before the Scottish Junior Gas Association, Western District, Feb. 6.]

The gas was first turned on to the town in the month of August, 1832; the whole plant having been completed to the satisfaction of the engineer appointed, who at that time was well known in gas engineering circles in Ayrshire. The question of appointing a manager having been gone over and a man duly appointed, he was instructed to make himself conversant with the manufacture of gas as early as possible. I have no doubt, however willing, in a small country gas-works at that date his troubles were only beginning, for even to-day, with a more modern plant, &c., the manager of a gas-works making (say) from seven up to fourteen millions a year, has not very far to go to seek his worries, especially if his plant be of an old pattern or date. Not only must he have a fair knowledge of the finer side of gas production and purification, but of distribution in all its branches, together with the manifold odds and ends which from time to time require his personal attention, both in the works and out of it.

The system of purification, for instance, in these bygone days was a worry to the manager in charge. The boxes becoming inadequate in a short period, necessitated the changing of one each day. The markets for the disposal of coke and bye-products in those days were not so plentiful as at the present, which brings about an incident which may prove of interest.

Having no great storage for tar and liquor, one of the directors, who also was a landowner, gave his sanction for the disposal of the tar in an old pit, and for many a day all the tar was carted

there and put down the shaft, and until this day it is known locally as the tar pit. Eventually this was stopped, and a new dea was formed—viz., that of mixing the tar with furnace coal used in the heating of the retorts. These, I may mention, were built of bricks. A tank was, therefore, constructed in the roof of the retort-house, so as (one would expect) to give the necessary head of pressure for the tar to flow into the furnace, and mix with the coal. However, this idea came to a sad termination by the tar becoming ignited, and the tank followed suit. The result was that the roof of the retort-house also fell a victim to the flames. This accident was, however, to prove a blessing in disguise to the manager, as he got permission to have erected a cast-iron tank of larger capacity, which served that purpose from those bye-gone days up till two years ago, when the Directors decided to convert an old holder tank in the yard into a tar and liquor one.

The question of coal was and must have been a hard one, as it all had to be carted direct from the pit head, the distance in one case being three miles. Not only so, but the coke produced was of very poor quality. This also applied to another good gas coal procurable in the locality. The gas, however, was of a very high standard as regards illuminating power and quantity per ton of coal used; but for many a year the coke produced was periodically removed along with the ash heap.

The supply of gas to the town for the first few years was out of a holder, of a little over 9000 cubic feet capacity, on the old principle of three columns, with counterbalance-weights, and chains. The inlet and outlet valves were hydraulicly sealed with water. This holder was erected complete inside a very substantial building of limestone, with a good slated roof. The walls of the building were some 2 feet thick. The holder had been repaired on more than one occasion; and it is still in use, though only fulfilling the small task of supplying the lights in the works.

I formed an idea then that if I could add a little more pressure by putting some weights on the outer rim of the holder, we could have the use of it. Alas! I was doomed to disappointment. On the first night after the weights were added, the man in charge called me up, to say that the inside holder was blowing gas. This trouble took some time and study before being solved. I found that the water-sealed valves had been constructed to carry only a certain pressure, with the result that, as soon as this was increased, they became unsealed; and the pressure of the new holder being greater than that of the old one, the gas was returning into the smaller one, and causing it to blow constantly. As soon as we removed the weights off the top of the small holder, and resealed the valves, the trouble stopped. Nevertheless, in my opinion, even though this holder remains as a memento of past practice, it is a menace and a danger, situated as it is in close proximity to various lights, and inside a building too.

The system of rates and charges for the gas was peculiar to its own surroundings. The principal, and perhaps the only, industry of any importance, was that of hand loom weaving; the town containing many weaving shops at this period. The weavers themselves, in their own opinion, were persons of importance, and therefore the Directors of the Gas Company had to consider them almost foremost. It might be mentioned that the consumers were divided into three classes, and the charge for gas was accordingly set to suit each. First, the weavers, who were charged at so much per jet. The jets themselves, so far as I can gather, were similar to a jet in a photometer, with a single aperture. The gas was so much per jet; but on no consideration must the height of flame reach above a certain given standard. This item caused many a dispute at different times between the two parties. The consumers under the heading, shall I say who were not weavers, or who could not afford to purchase a meter, had their gas also at so much per jet; but their light had to be extinguished at a certain hour. I may say, before leaving the question of charges, many were guilty of falling in arrears with their payment. The duty of the manager in those cases was to advise them that such was the case; and in the event of no notice being taken of the warning, he went personally and sealed up the jet, until the consumer paid up what arrears he owed.

From these early days and customs, the use of gas generally for lighting, cooking, and power purposes has increased, until from quite a small works the production has been greater every year. The returns for 1910-11 were 10,000,000 cubic feet made; last year, 1913-14, the make had gone up to 12,240,000 cubic feet. In my opinion the main factors of the increased use of gas is the advent of the incandescent light, the all-round use of small cooking appliances, and the automatic meter, which gets a small company or council gas-works more in touch with a certain class of consumers than anything else.

It is hard sometimes to convert a user of oil to be a consumer of gas. Gas is dangerous, they will tell you; and they never were used to a fancy light with globe and mantle. But with a little diplomacy and tact, and a percentage of civility, it is wonderful how many new consumers one can get. I always found that one has to be a little obliging and considerate towards the consumers, as it goes a long way in many cases. One must remember that the users of the commodity which you are manufacturing for sale are the backbone of the whole concern, because no consumers means in the long run no works; and it follows there will be no use for a manager.

On taking over the works four years ago, there was a good deal of renovation necessary—retorts needed repairing, and others resetting. The bench was in rather a precarious condition. The end wall was stayed-up by a wood beam, and a support made by setting a sleeper in the floor. The ovens contained two benches of two, and two of four, the back and one of the end walls were built hard against the retort-house wall and gable respectively, the longitudinal tie-rods being carried right through the gable of the house and held by a plate and nut. The mouthpieces were of three or four different patterns and sizes; and when an oven was being rebuilt, one had to use great care in marking, or there was trouble in re-erecting the ascension-pipes.

On a Sunday afternoon, late in July, the stoker on duty in the retort-house called me hurriedly, saying some strange noises were emitting from the bench. The oven next the end wall, being out at the time, was the first I went to; and I found to my consternation that the end wall was moving away from the bench. Here was an incident to set one's brain in a biz, as it threatened to demolish the whole bench, if allowed to go any further. Well, I called out the odd man, and sent to the joiner for some battens. In the interval, I removed the mouthpieces and ascension pipes, to take as much strain off the end oven as possible. Then I stayed the end wall with wooden uprights, and longitudinal ditto to the gable of the house, also fastened an upright to take the place of the old broken cast-iron one, and carried one across to the back wall, and gently raised the end of the hydraulic main so as to rest on this cross one to take as much weight off the falling bench, as the hydraulic main was only sitting on cast-iron cradles, resting on the brickwork of the bench.

Later on, when I started with the erection of our new bench, I found the secret of the old bench's sudden movement was that the longitudinal tie-rods of the bench were built into the flue of one of the ovens, which passed from front to back on top of the bench itself. The broken ends of this tie-rod were burnt to a point like a huge pencil, and on this slender support the end wall had been depending for sustenance for a long time.

At times with this old bench working it was hard to maintain a steady vacuum on the retorts, a back-pressure often occurring. On examination I found that the outlet at the end of the hydraulic entering to the foul main was only a hole cut at a certain level. This had become choked-up with ammoniacal salts and tarry matter, which had, of course, raised the level of the liquor in the hydraulic main a good 3 inches. On clearing this away, I had much better results in our carbonizing.

On examining the condensers I found the overflow to be of an old type, formed by an upright 2½-inch pipe from the bottom plate to a certain level. The only method of removing the tar from the bottom of the box was to take off the end hand plate. This was altered by boring a 1½-inch hole, and tapping it, putting in a cross tie-piece and a down pipe into an open syphon pot, and then cutting a 2½-inch hole level with the bottom plate. I fixed a stop-cock and knee which also empties into the same syphon, and thence by the main tar-pipe to the tar-well.

The washer (which is a very old pattern) was next examined. On removing the top plate, which is 4 feet square by 1 inch thick cast iron, there were no means available for lifting it back out of the way, which necessitated the erection of a scaffold on to which I could fasten the necessary tackle. This gave me the facility of examining the inside. The discovery was none too encouraging. The wood screens were solid from bottom to top with salts and tarry matter. The top board of the central division had been removed; the gas therefore had no difficulty in passing from the inlet to the outlet, without having to pass over the screens.

I decided to remove the old screens and put in a new overflow at the bottom, set to a seal and sealed in an open syphon-pot. One obstacle came in the way though during our investigation, as I was unaware of the inside condition until the top cover was removed, and then I saw it was going to take some days before the job was completed. There were no means of bye-passing the washer; the inlet and outlet pipes being 8 inches. I therefore cut an old ascension-pipe the exact length needed, and slipped one end into the outlet first, then pulled it back into the inlet, and made two temporary joints of rope yarn and red lead, and so up and down between the pipe bye-pass and the side of the washer. I cleaned out the whole thing and fitted in our new screens. Before replacing the top cover, I bored and tapped two holes; one for the weak ammoniacal liquor which I afterwards supplied, and the other for a water spray.

Through the roof of the old holder house, and directly above the washer, I put up two steel beams, resting them on the wall of this house, with distance bolts between the beams. On these beams I put a square galvanized tank, into which the liquor is pumped to supply the washer. The distance bolts serve a double purpose. On the front one I can fix the tackle for lifting the cover at any time for cleaning or repairs, thereby obviating the necessary scaffold as formerly. When these alterations were finished, the results obtained from the washer were very satisfactory.

The purifiers are three in number, two 8 feet by 8 feet by 4 feet deep, and one 12 feet by 8 feet by 4 feet deep; the screens being in a very bad condition. These were replaced by a new set for each; also the tee-iron bearers where necessary. The centre purifier apparently had been one of a series of purifiers before being fitted in at Beith, and had a plate acting as an outlet the full length and depth of the back of the box; also there was an extra outlet. Both of these were of no use. I therefore removed them, and filled up the bolt holes with bolts and red-lead washers. This slight alteration gave me more purifying area in the same box, and was in no way detrimental to the construction of the purifier itself. The bottom of each purifier, when the last row of

screens was removed, always contained a few inches of liquor and water. This was troublesome when cleaning. I remedied this by inserting a covered syphon-pot at each end of the mains, and since doing so the trouble has been overcome.

In the spring of 1912, my Directors decided to erect a new retort-bench on a modern principle. Owing to circumstances, I found it would be necessary to either rebuild the No. 1 oven of four retorts in the old bench or repair them if possible to carry us through the summer months. By so doing I would be able to erect three of the four new ovens.

After the old oven was put out and fairly cooled down, an inspection was made of the retorts, and I saw their condition was none too promising. After removing the furnace frame to allow for admission, I went inside, and their condition was even worse. When viewed from the interior, the soles of the two top retorts were past redemption. Nevertheless, I started and cut out the bad soles, and put in a new one in each, composed of flue-covers well laid in fire-clay and fire cement. Then I cleaned out all cracks and pointed them well with the same mixture, and gave the whole interior a good coat of fire cement wash, well rubbed on. Then we put back the furnace frame and kindled up, and they carried us through the summer months till September, when the new ovens were dried and lit-up. The result obtained from the old four was indeed surprising, and financially well worth the attempt. The new bench contains four ovens in all, one of five, two of four, and one of three settings. The first of the four can if necessary be converted into a five, and the one of three into a four. The full number of retorts available would then be eighteen in all.

The gas on leaving the hydraulic main passes through an 8-inch steel foul main which runs round three sides of the retort-house. The erection of this foul main saved us the expense of adding to our old condensers, which were beginning to become rather incompetent to do all that was necessary. When the winter season set in, the anxiety of the previous one, with an old bench and old retorts, was removed, and the results, even with a new bench, &c., were very satisfactory.

The existing tar and liquor well at that time, as already stated, was built of cast-iron plates bolted together, but its capacity was very inadequate; and when any delay occurred in the transit of the casks, the liquor ran to waste down an old drain, through an adjoining property, and thereby caused a nasty smell at times. After going over a report on this matter, the Directors decided to convert the old holder tank into a tar and liquor well. This task I tackled myself, with the assistance of extra labour. I first of all hired a diaphragm pump, with a 4-inch suction-pipe, and pumped the water out of the tank. I also procured a hand crane, and afterwards proceeded to cut up the sheeting. As this was unsuitable for re-erection, I was not particular about keeping the plates in sections. After the crown was removed, then the body followed. This I cut in four large sections, from top to bottom, removed the two curbs, and attached an eye bolt to each in turn, lifted it like a huge sail on to the yard, and then cut it up for removal.

The wall of the tank was soundly built of stone and lime, and pointed with cement, but the bottom was only formed of clay. I covered this all over with fine ashes and lime mixed, and laid the whole surface with bricks on edge, well grouted with cement—finally going round the wall and touching-up any holes which were visible, and finished with a good coat of cement wash well rubbed in. The top was covered with steel beams and concrete, finished with cement and granite.

I laid a central beam, supported by a brick column in the centre, from the bottom, 2 feet square. The crossbeams were then put in place, and bolted to the main beam. The space between each cross beam was filled with circled sheets of corrugated iron, to carry the concrete—the whole making a strong and firm job. The reason I needed a strong job was that the lorries had to pass over the tank top when removing the tar-casks. On the top of the tank I also erected a platform, formed of steel beams and sleepers, on which it is possible to fill eight casks at one time, under cover, which is a boon to the men during the winter.

When the whole was completed, and the tar-main almost laid into the tank, the discovery was made that some water had gathered on the bottom of the tank. At first I was under the belief that this was due to condensation, but after drying-out the whole thoroughly, and nothing showing on the wall, I decided there was some other cause. Day after day I tried to find the reason; and at last I made up my mind to bore a hole here and there in the floor. After a number of unsuccessful attempts we at last got one which without doubt showed immediately there was a mystery underneath at this point. I therefore opened a hole in the floor 5 feet by 5 feet; and after going down 3 ft. 6 in., I came on a stone flag 4 feet square by 6 inches thick. The removal of this by hand was impossible, so I attached tackle on to the steel beams overhead, and lifted it up on to the floor. Judge of my surprise when I found a very fine built well 8 feet deep by 3 feet in diameter. Here was a problem indeed to solve. The well was a curiosity in the locality, as some masters paid a visit to see it during the time it was open.

I proceeded to remedy this trouble by cutting a hole in the concrete top of the tank exactly above the well, and fitted up a hand pump. By this means we were able to see where the spring entered. I first putin a length of 9 inch fire-clay pipe, and puddled it well round with clay, to collect the spring into the pipe, then laid a good layer of cement concrete over this. Next followed another length, which was similarly treated, and so on until the top of the last pipe was 6 inches off the floor level. When this had thoroughly hardened, the pipe shaft was dried out, and the hole filled with Roman cement. Before filling in the break in the floor, the tank bottom was closely watched for a month to see that all was secure. When I was satisfied that everything was right, I laid the whole surface of the floor with two inches of cement and granite. This was allowed to harden for three weeks, and on examination the job was found to be satisfactory—only I had some trouble regarding the first two or three lots of liquor which was pumped out not being up to the strength, but this was caused by the weak liquor not circulating properly through the washer. After this was remedied, the strength was maintained at the standard that was required by the purchasers.

The coal storage was very inadequate. It consisted of three small sheds, which had formerly been weaving shops, with thick walls and low roofs. I prepared a plan, which was gone over at a meeting of my Directors, who decided to go on at once with the alterations, in view of getting in a stock of coal before the winter season came on.

The old roofs were removed and a one span thrown over the whole area. The old division walls were also demolished, with the exception of the outer one, which was raised 2 ft. 6 in. The old floor, which was composed of bricks laid on ashes, had sunk in many places. I decided to lay a new floor, formed of 8 inches of handset bottoming, then 4 inches of concrete, finally finishing off the surface with 2½ inches of cement and granite, corded every 6 inches. Since being laid, it has well repaid the expenditure incurred.

It was necessary in the shed to have divisions for the different classes of coal. I put in, previous to the floor being finished, steel joists set upright and underground to a depth of 3 feet, well filled round about with cement concrete. The space between each joist was filled up with sleepers, with a space between each sleeper of 2 inches. This space served as ventilation for the stacks of coals. It was also a saving, for if I had made the divisions solid, it would have required far more sleepers. When I wish to use the coal in any one of the three spaces, all that is necessary is to remove the sleepers and get a road right through without going outside the shed at all.

The new holder, which is situated about 80 yards from the works, used to cause come inconvenience to householders by the night stoker passing to and fro to see what gas was in stock. I overcame this by leading a flexible wire from the top curb of the holder right over to the gas-works yard and on to a board with grooves in it. Sliding in these was a lead weight with a pointer; the board being marked off into plates, halves, and quarters. Thus it is only necessary to go into the yard and look at the gauge-board, and the quantity of gas in stock is visible either by day or by night.

DISCUSSION.

Mr. FRAZER said that Mr. Dale had made reference to the incandescent light being one of the principal factors in the increased use of gas. They were indebted to the Welsbach as being the very heart's blood of the gas-lighting profession as a lighting medium; but the incandescent light was not responsible for the large sale of gas—it was claimed to be the very reverse. With regard to the removal of the mouthpieces and ascension pipes through the end of the bench giving way, he did not see how this would help him in any way unless to take off the dead-weight or else to prevent the other portion of the main giving way. In his opinion, the dead-weight of the material would help to keep it up. Mr. Dale also made reference to the choking of his seal by ammoniacal salts. He was glad that this had been pointed out in the paper. It had never been raised at the Association meetings before except by himself (Mr. Frazer). It was a fact that, when one had an aperture from where the tar and ammoniacal liquor were thrown off the hydraulic main, one was sure to have a deposition growing at this particular point until there was perhaps 4 inches of it. Before the advent of the weir-valve, a piece of sheeting was placed between the overflow of the hydraulic main and a point which determined the height of the seal. In regard to the connecting of the bye-pass, he was at a loss regarding Mr. Dale's explanation, because he could not see how he could take the old ascension pipe and slip it in to the outlet, and then pull it back through the inlet, unless the plant was out of action. The author said there was a deposit in the bottom of his purifier. He supposed it would be ammoniacal liquor. He said he put a syphon in at the end of the main; but with the ordinary gas-purifier it would serve no purpose. Mr. Dale told them of his weak points and failures, and how he got out of them. This sort of confession should be one of the chief features of the Association.

Mr. FULTON, who explained that the author would have an opportunity in the future of replying, said it was an interesting paper and showed how full of resource the manager of a small works must be. It struck him, in regard to the transforming of the gasholder into a tar well, that instead of buying corrugated sheets Mr. Dale might have used the gasholder plates.

Masonic.—Mr. G. R. Casterton, the Manager of the Melton Mowbray Gas Light and Coke Company, Limited, has been installed W.M. of the Rutland Lodge, No. 1130, meeting at Melton Mowbray.

REGISTER OF PATENTS.

Burners for the Combustion of Gaseous Fuels and Air.

WILSON, W. A., and DAVIES, H., of Armley, near Leeds.

No. 1078; Jan. 15, 1914.

This invention relates to improvements in burners for the combustion of mixtures of gaseous fuels and air; the object being to construct a burner comprising a combination of features as follows:

"A burner orifice, nozzle, or cap from which the flame burns, a burner-tube and gas-nipple with suitable arrangements for the admission of air, and a pressure regulating device—all arranged in such a manner that a silent burner is obtained"—one from which "all noise is practically eliminated."

Such noise, according to the patentees, may arise from all or any of the following causes: 1. A noise produced by the streaming out of the gas from the gas-nipple—called "injector noise." 2. A noise produced by the entrance of the gaseous mixture into the burner-tube, and the subsequent passage of the mixture through the burner-tube—"burner noise." 3. A noise generally produced when a well-aërated flame burns from an unrestricted orifice—"flame noise." 4. A noise, known as "tap noise," which experiments have shown is liable to occur when the burner is turned low by means of the tap.

The patentees are aware that governors have been employed, more especially with heating-burners, to limit or control the quantity of gas supplied, and these are generally placed before the gas-tap. Such governors have not been of the type they prefer to use, nor have they been employed with burners and gas nipples of a construction suitable for the obtaining of their results.

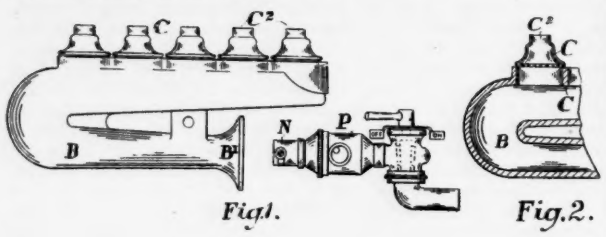


Fig.1.

Fig.2.

Fig.3.

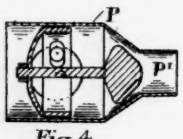


Fig.4.

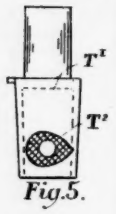


Fig.5.

Wilson and Davies' Gas-Stove Burners.

To overcome "injector noise," a gas-nipple N (figs. 1 and 3) is employed which terminates in a thin plate N^1 pierced with a number of smoothly drilled holes (through which the gas issues) capable of regulation in any usual manner. In the arrangement shown, a regulating device, in the form of a sleeve carrying plates, is provided to close one or more of a series of apertures by means of a handle working in a slot (fig. 1) to cause the plates to pass over and obstruct or free one or more of the apertures iu the nipple—there being no apertures in the nipple under the plates when the supply is fully open.

The patentees say they find that "injector noise" increases greatly when the pressure of gas supplied to the nipple is greater than 15-10ths water-gauge; and in general they prefer to employ pressures of from 10-10ths to 12-10ths water-gauge. In order to render the nipple effective, a pressure regulating device P is placed on the burner side of the tap, which either automatically or by hand lever or screw adjustment reduces the pressure of gas passing through the nipple to the required extent. A suitable regulator is shown in figs. 1 and 4. It comprises a cone P^1 adapted to be moved within a similarly shaped fitting to close or open its freeway by (say) a turn-button or like carrying a projection to operate in a slot in a sleeve which carries the cone P^1. The turning of the button operates the cone towards or from the neck of the fitting. Where the pressures available do not exceed that before mentioned, the regulator may be inoperative, but will enable the burner to be used for increased pressures and to permit of regulation, if and when required.

To overcome "burner noise" the gas-nipple N (fig. 1) must be placed at some distance from the mouth B^1 of the burner or mixing-tube B. As an example, it is mentioned that in a heating burner giving five well-aërated flames, each consuming up to 4½ cubic feet of coal gas per hour when the gas-nipple consists of fourteen holes drilled in a plate within a circle of $\frac{7}{16}$ inch diameter and the actual burner mouth is circular and of 1-inch diameter, the distance between the nipple and the burner mouth is approximately $\frac{5}{8}$ inch.

To overcome "flame noise" where the flame burns from an unrestricted orifice, it is proposed to employ, in connection with the outlet C^1 from the burner or mixing-tube (of comparatively large size), a cap C (figs. 1 and 2) externally cone shaped, or dome shaped, or a combination of both forms. The lower opening into the cap is of comparatively large cross sectional area; and the upper or final opening C^2 of much smaller cross sectional area. Inside the cap is a device which "may take various forms so long as the quick outflow of the gaseous mixture from the centre of the cap is prevented or checked, and an even flow over the whole area of the outlet is produced, resulting in a silent flame." These devices comprise a gauze disc of suitable mesh, placed in the lower portion of the cap as described in patent No. 12,319 of 1913, a perforated metal plate or plates, or a similar arrangement of porcelain or steatite plates, or a disc with radial arms, or a cone-shaped device centrally placed in the cap so as to form an annular space between it and the cap, or radial passages radiating from a central pin to the cap. In all cases, however, the area of the freeway for the gaseous mixture through the cap will be greater than the cross sectional area of the final orifice C^2, which will be unrestricted. Thus the flow of gaseous mixture is not unduly checked.

Their experiments have shown the patentees that when a properly regulated burner to give the desired results is used, tap noise may make itself heard on turning down the burner by means of the tap; and this they have found they can overcome by means of a tap T (fig. 1), having a centrally bored plug T^1 (fig. 5) having an exit opening T^2 cut V shaped. In the hollow plug are fitted one or more gauze screens arranged to cover the exit opening—an aperture being formed in the screen centrally with the exit opening and of less diameter. This device is to prevent or reduce the hissing or whistling noise produced by the gas passing through the tap, and which noise increases considerably when the tap (if unprovided with the gauze) is turned down.

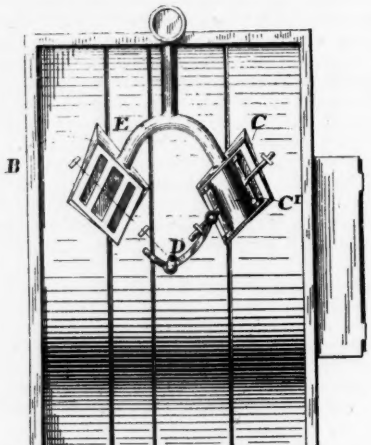
Gas-Meter Valves.

WILSON, J. H., of Coventry, and WILSON, G., of 's-Gravenhage, Holland.

No. 1574; Jan. 20, 1914.

This invention relates to gas-meters "provided with two D-valves, each connecting a central port in its seating with two outer ports therein alternately, and in which the two outer ports in a single seating communicate one with one and the other with another of two gas compartments on opposite sides of a separating diaphragm."

Such a gas-meter, wherein the lines of travel of the two valves are inclined to one another, has the two outer ports in a single valve seating so arranged that they lie entirely on opposite sides of the diaphragm that divides the two gas-compartments; the object of this construction being "to do away with the comparatively long conduits which have heretofore been used to conduct the gas from the ports to the interior of their associated compartments." By arranging the ports in this fashion they can pass straight through from the surface of the seating to the interior of the gas-compartment.



Wilson's Gas-Meter Valves.

A plan of the meter is given, with its top and most of the valve-actuating mechanism removed.

The casing is circular, and provided at its upper side with a rectangular extension A^1, which encloses the valves and their actuating mechanism, and also acts as a reservoir to the gas before it enters the various measuring compartments. The casing is divided along the line A^2 by a rigid partition, so as to form two independent gas measuring chambers, divided respectively along the lines A^3 and A^4 by flexible diaphragms, which thus form two compartments in each chamber. Above the two chambers are soldered to the casing two valve-seatings B C, each provided with a D-valve of the usual type. One of these valves is shown at C^1. It has connected to its sides two rods working in orifices in brackets, and so guiding the valve in its travel backwards and forwards across its seating. A shaft D is mounted in brackets connected to the casing, and has a crank to which are connected two links whose free ends slide over the pins upon the D-valves (as shown) and are held in position by a nut at the end of the pin. The shaft is operated by the diaphragms in the well-known manner.

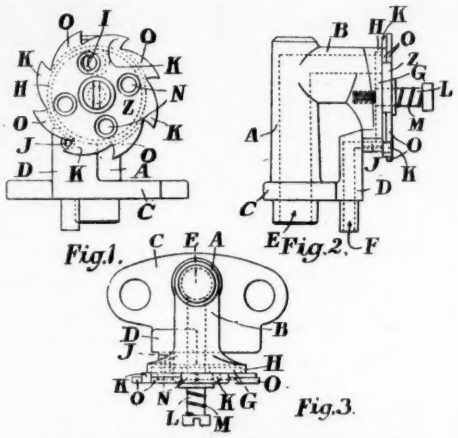
The valve-seating B is pierced by three elongated ports; but instead of being rectangular, as usual, they are rhomboidal. The central port (as customary) is the outlet port, and is in direct connection with the branch E, which is, in turn, connected to the main outlet conduit. The outer ports communicate with the gas-measuring compartments; and their lengths are disposed obliquely to the line of travel of the valve. Each one is so placed as to lie entirely on the side of the diaphragm on which is found the gas-compartment with which it communicates. By this means each outer port opens "directly into the corresponding compartment without the use of any conduit, and consequently the construction of the meter is thereby simplified and cheapened."

Controlling the Supply of Gas to Burners.

ANDERSON, J., of Edinburgh.

No. 1675; Jan. 21, 1914.

This invention relates to pressure operated controllers which cut off the supply of gas to the bye-pass when the main burner is alight. It consists in a controller in which the face of a ratchet wheel is mutilated to effect the covering and uncovering of a passage in connection with one of the burners.



Anderson's Gas-Burner and Bye-Pass Controller.

Fig. 1 is a front elevation, fig. 2 a side elevation, and fig. 3 a plan looking from above.

The casting comprises a pillar A, an arm B at right angles to it, a base C, and a shorter pillar D. A and B are bored internally for a passageway E, and the part D for a passage F. The end of the arm B is formed with a recess G leaving an upstanding rim H. Just within the rim there is provided an upstanding wall I around the opening connecting with the passage E; and just outside the rim H is a small pipe J leading to the passage F. The rim and the faces of the two outlets I J form an accurate seating for the ground face of a ratchet wheel Z mounted on the spindle L, and provided with a light spring M forcing it towards the seating. The ratchet wheel has a number of holes to uncover the outlet I; the lands between these holes covering the outlet.

The faces of certain of the ratchet teeth (O on the side adjacent the saucer) are cut away—that is to say, they are of less thickness than the others (K), whereby the latter in the rotation of the ratchet wheel contact with the outlet of the pipe J, while the former are quite clear, leaving a space between the two. The arrangement is mounted so that gas has free access to the mechanism, and the passage E leads to the main burner, the passage F being connected to the bye-pass.

In operation, as the ratchet is moved step by step the main burner will be "on;" but before (on a further step) it is extinguished, connection will have been made to the bye-pass. Subsequently, when the main burner has again been turned on, the connection to the bye-pass will be broken.

Any suitable means may be provided for operating the ratchet wheel; but the patentee prefers to use an arrangement similar to that shown in patent No. 6754 of 1909.

Clinkering Apparatus for Producers.

DUCKHAM, A. M'D., of Ashstead, Surrey.

No. 1345; Jan. 17, 1914.

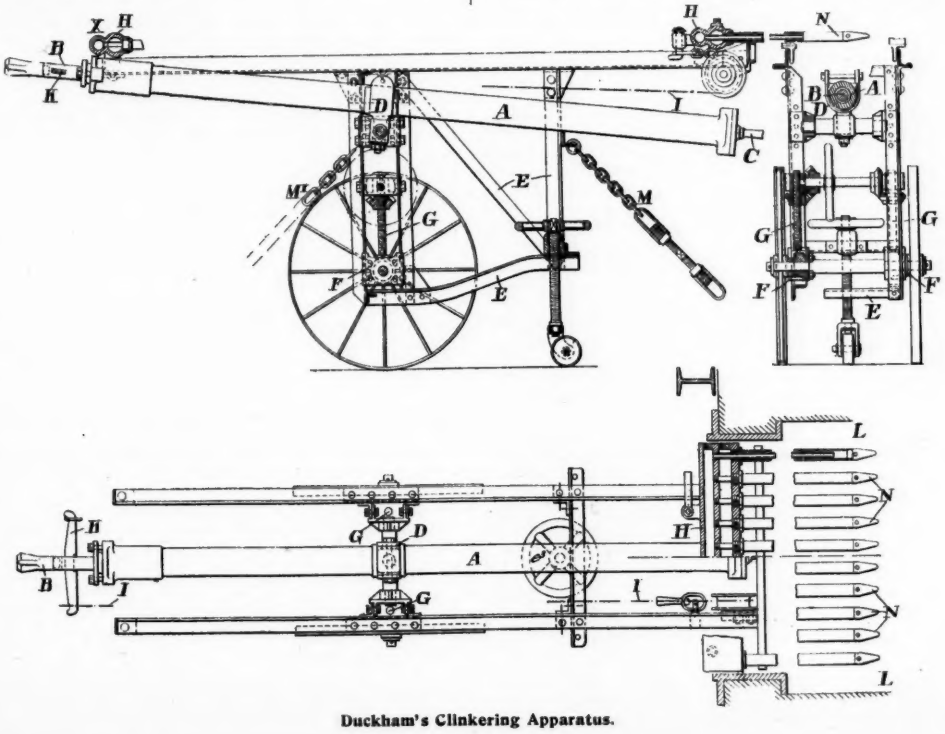
In his specification, the patentee points out that in clinkering producer furnaces without interrupting operations there are two modes of procedure. One consists in driving individually a number of bars through the lower part of the bed of fuel—generally between the upper bars of the step-grate now commonly used in producers—and removing the clinker from between the temporary support thus afforded and the grate by means of a poking tool which breaks-up the column of clinker. The other mode consists in cutting through the column of clinker by a cutting bar moved by hand or power through the column and followed by a temporary grate. Thus the lower end of the core of clinker is cut off and the permanent grate (made to slide for the purpose) is withdrawn, to permit the lower end to fall-out of the producer. The present invention relates to the first of these modes, which "is open to the objections that considerable time is consumed in driving the bars individually, and that if the clinkering operation is at all lengthy the bars can be withdrawn afterwards only with considerable difficulty."

The illustration at foot shows a longitudinal section, a cross section, and a sectional plan of a temporary grate carried on rails mounted on the carriage of a machine for breaking-down clinker, as described in patent No. 23,862 of 1912.

The cylinder A contains a hydraulically operated piston carried by the stem of the poker B. The handle C serves for moving the cylinder and poker in any desired direction; this being possible owing to the fact that the cradle D of the cylinder is mounted on a pivot which turns in an axle, while the latter turns in bearings bolted to uprights of the frame E constituting the carriage. These uprights serve as guides for the sliding axle-boxes F of the wheels; and the frame is carried on this wheel axle by screw spindles G, which extend through blocks bolted to the uprights, and in which are mounted nuts to rotate on the spindles but not able to move axially thereon. The nuts can be turned through bevel gearing by rotating the spindle by a hand wheel, whereby the frame is raised or lowered on the axle. The transverse member of the frame carries a screw-threaded boss in which works a screw spindle resting on a castor wheel and serving to tilt the frame on the axle. The frame carries angle-iron rails, on the vertical webs of which slides the cross head H of the temporary grate, kept in place by depending lugs. Mounted at the front end of the rails are pulleys for chains T, which are attached at one end to reversible hooks on the cross head and at the other end to a cross bar K adapted to be easily inserted in a slot in the end of the poker B.

When the machine is out of use the cross head H is in the position marked X, and the poker is fully home in the cylinder. When the temporary grate is to be forced into the producer L, the machine is wheeled into position before the stoking door and anchored by chains M M¹. The poker is now thrust out of the cylinder by admitting water, thereby putting tension on the chains and pulling forward the cross head until the temporary bars N are thrust into the producer just above the permanent grate bars. The handles of the hooks are now turned through an angle of 90°, and the links which engage the hooks are turned by their handles until they are disengaged from the hooks, whereupon the chains fall on to hooks carried by the rails. The carriage may now be unanchored and withdrawn so that the rails slide away from the cross head and the temporary grate is left in position in the producer.

In order to use the poker, the chains I are detached from the cross bar K; the latter is removed; and the carriage is turned into a position at an angle of 180° to that shown. When clinkering is finished the carriage is returned into the position shown, but with the poker fully home. The cross bar K is inserted; and the chains I are attached as



Duckham's Clinkering Apparatus.

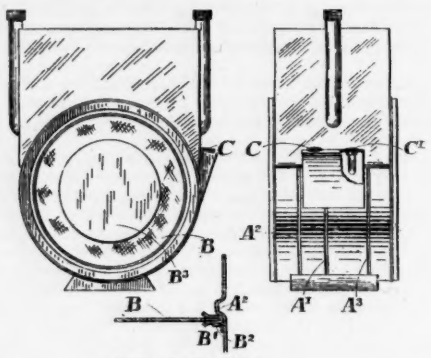
before, except that this time they do not pass round the pulleys, and the hooks are reversed by turning their handles through a further angle of 90°. The poker is now extruded from the cylinder to pull the temporary grate from the producer and return it into the position marked X.

Gas-Meters.

WILSON, J. H., of Coventry, and WILSON, G., of 's-Gravenhage, Holland.

No. 7341; Jan. 20, 1914.

The present invention has for its object to provide a construction of meter casing which shall afford greater facility than heretofore for attaching to the interior of the casing such partitions or diaphragm supports as are usually required; also to provide means to maintain the flexible diaphragms in a pliable condition.



Wilson's Gas-Meters.

The meter comprises a cylindrical casing divided into two chambers by a central partition and chamber subdivided into two compartments by diaphragms in the usual manner. The casing is grooved or indented at A^1, A^2, and A^3 so as to provide interior ridges against which the partition and the diaphragms may be positioned, and to which they may be soldered.

Each diaphragm is in the form of an annulus B surrounded at its outer edge with a metal rim clipped to it, to hold it in place under the pressure of the gas during the gas measuring operation. The rim is inserted into the casing until it abuts against the ridge formed by the indentation A^2. When in this position a metal annulus B^2 is inserted in the casing until it abuts against the rim B^1, when it is soldered both to the rim and to the casing—thus positioning the diaphragm. The central aperture in the diaphragm is closed by a rigid metal disc, so that the amount of material in the flexible diaphragm is reduced to a minimum.

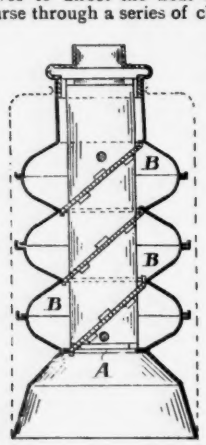
In order that the flexible leather diaphragms may be maintained in a supple condition, conduits are provided—one leading to each gas-chamber—whereby oil may be introduced. The conduits are at C and C^1; and "by reason of the cylindrical construction of chamber the oil will have ready access to the leathers, which would not be the case with the rectangular construction of casing usually adopted." Also by arranging the outer orifices of the conduit so that they are accessible merely by removing the seal (without disturbing any of the connections or the casing of the meter) an "advantageous construction is obtained."

Water-Heaters.

WILSON, H. F., of Armley, near Leeds.

No. 16,553; July 11, 1914.

This invention consists in an improvement on the water-heater and heat-directing device described in patent No. 13,558 of 1910. In that specification a baffling or heat directing device was described, which serves to direct the heat or products of combustion in a sinuous course through a series of chambers suitably water jacketed, and also to strengthen such chambers—the baffles being constructed with chambers that could not be withdrawn. The present improvement comprises a series of baffles arranged in the centre of chambers similarly constructed, but all arranged so that the baffle-plates and framework may be readily withdrawable for cleansing or other purposes, while at the same time the baffles cause the heated products to travel around the interior of the casings.



Wilson's Gas Water-Heater.

B are casings placed (one above the other) in a water jacket or casing shown by dotted lines. The chimney, carried from the upper casing, is somewhat larger than the opening A into the first or lower casing, through which the products from a "suitable heat generator" flow—the reason for this being that the flange of the opening A may form a support for the framework carrying the baffles. These baffles are arranged to cause the heated products to travel up an incline till they impinge on the casing at one side towards the top, and then pass around the casing till they travel over the baffle, and so on to the next casing—finally reaching the outlet, which leads to an ordinary flue.

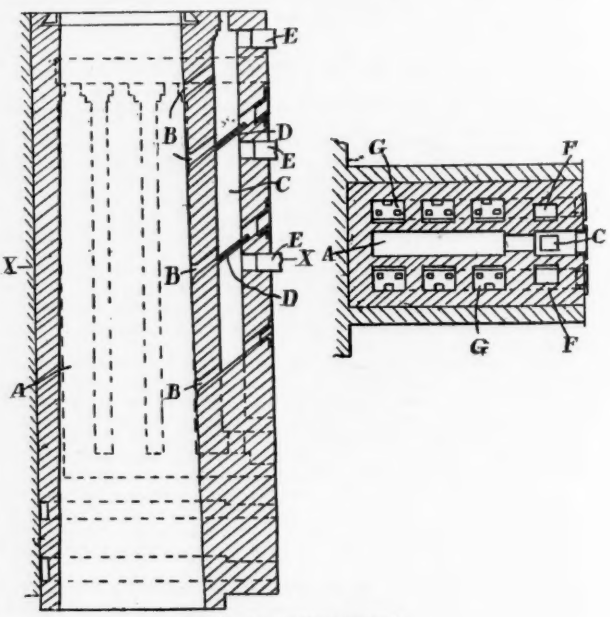
Vertical Retorts.

DUCKHAM, A. M'D., of Ashtead, Surrey.

No. 17,667; July 25, 1914.

This invention relates to a vertical retort for carbonizing coal for gas making or for coke making, in which the gases and volatile products may be withdrawn from the several zones of the retort and collected either separately or together and in a rapidly cooled condition, or (by a modification of the construction) after subjection to more or less considerable heating.

The construction comprises a flue connected with ports at different levels in the wall of the retort, and adapted to be subdivided into two or more collecting chambers, each having its own off-take, or to be used as a single collecting chamber, and in such a position (relatively to the heating flues of the setting) that the products escaping into it are not subjected to any further heating, but are cooled as rapidly as may be. "This construction alone affords considerable flexibility as compared with the known suggestion of merely collecting the products from different zones separately, since it is possible to collect together the products from two or more zones while in the condition which they have directly they leave the retort, with a result different from that which ensues when the separately collected products are subsequently mixed." In order, however, that the nature of the products may be varied by further cooling or by heating them, the invention also provides flues which can be traversed by cold air or can be heated at will as a whole or in portions to suitable temperature, and are situated alongside the collecting flue, so that the products may be further cooled or heated in any one or all of the chambers into which the collecting flue can be subdivided.



Duckham's Vertical Retorts.

This construction (having the heating flues) is illustrated in vertical section through the retort and a horizontal section on line X.

The retort A has the long rectangular cross section now well known. In the wall forming the end of this rectangle are the gas-ports B at different levels. They open into the collecting flue C, in which are dampers D for subdividing it into as many compartments as there are ports (except that the top compartment serves two ports) and an off-take E for each such compartment adapted to be connected with an exhauster. On each side of the flue B is a heating flue F—in this case connected with the heating flues G of the retort and heated by the same gases under control of dampers. With dampers D in the position shown, the products from three zones of the retort are collected each separately; but if the dampers are withdrawn, and the two lower off-takes closed, the products from all the zones will be collected together from the top off-take.

The flues F may be similarly provided with dampers to subdivide them into compartments corresponding with those of the collecting flue; and each such compartment may be separately connected with the supply of heat and the waste gas flue, so that each compartment of the collecting flue may be heated to any desired temperature.

Ormskirk Gas and Electricity Bill.—The Ormskirk Urban District Council and the Gas Company have come to terms in regard to the Gas and Electricity Bill which the latter are promoting in Parliament, and which the Council had decided to oppose. The terms under which the Council agree to withdraw their opposition are mainly as follows: That the Company shall not, by reason of the extension of their mains to Parbold, increase the price of gas to the Council or to any consumers in Ormskirk; that all the electric mains the Company shall lay in Ormskirk shall be underground; and that clauses 19 and 45 be withdrawn from the Bill. The settlement has given much satisfaction in the town. The fear was felt that if the Bill in its original form had gone through Parliament without opposition, the Company, by the aid of clause 45, would have been empowered to buy out by agreement the present electric light undertaking in Ormskirk, and so secure a monopoly of the lighting of the town.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following progress has been made with Bills:—

Bills presented and read the first time: Ashington District Council, Plymouth Corporation, Sunderland Corporation (Wearmouth Bridge), Wolverhampton Corporation Water.

Bills presented, read the first time, and referred to the Examiners: Altrincham Gas, Brighton and Hove Gas, Frimley and Farnborough District Water, Ilfracombe Gas, Northwich Gas, Ormskirk Gas and Electricity, Prescot Gas, South Staffordshire Water, Spennymoor and Tudhoe Gas, Sutton Water, Warwick Gas, West Gloucestershire Water, Yorkshire Electric Power.

The Shifnal Rural District Council have petitioned against the Wolverhampton Corporation Water Bill.

HOUSE OF COMMONS.

Coal Freights and Shortage.

In the House of Commons last Wednesday,

Mr. PETO asked the President of the Board of Trade whether he proposed to take any steps to secure the provision of adequate steamers to carry coal from the North of England to London at reasonable and fair rates of freight.

Mr. RUNCIMAN said His Majesty's Government had taken steps to meet the case to some extent by employing in the coasting trade, and especially for the carriage of coal to London, enemy steamships detained in the United Kingdom for the period of the war. He understood that the increase in the available tonnage had already had an appreciable effect in the reduction of coal freights to London.

Mr. PETO asked what was the rate of freight for the ships that had been employed.

Mr. RUNCIMAN said he must have notice of this question.

Mr. CROOKS: Does the Government itself fix the rates?

Mr. RUNCIMAN: No. We do not fix the market rates. These vessels are chartered at the market rates.

Mr. CROOKS: Then it is possible to rig the market.

Sir FORTESCUE FLANNERY said the rate of freight was 2s. before the war broke out; the rate paid by the Admiralty for ships commandeered was 4s.; and the rate of freight now charged was 11s. He was about to continue his remarks when

The SPEAKER interposed, and pointed out that the honourable member was giving information, and not asking a question.

At a subsequent period,

Sir FORTESCUE FLANNERY asked Mr. Runciman whether he was in a position to state the result of his examination into the complaints of the London Gas Companies as to their difficulties in obtaining a proper supply of coal to maintain the lighting of London; whether he would state if any steps had been taken by the Board of Trade to relieve the scarcity of tonnage for coal transport from the North to the Thames; and whether the supply of tonnage obtained from the use of interned alien vessels would be at charges proportionate to those paid by the Admiralty for the hire of coastwise colliers commandeered out of the Thames trade.

Mr. RUNCIMAN: In consequence of the deficiency of the seaborne coal supplies to London due to shortage of tonnage, the Government have brought into use certain detained enemy steamers, which are now running from the coal ports to London. For the use of these vessels the market rates of freight are being charged, as any other course would have the effect of some contractors getting an advantage over others—there not being enough of these Government vessels to meet all needs—and would probably lead to free vessels leaving this run for a more remunerative one elsewhere. The increase in the available tonnage has already conduced to some reduction of freight rates.

Sir FORTESCUE FLANNERY: Is it not the fact that 11s. a ton is being charged, that coal in the East End of London is being charged to the buyer at 2s. 6d. per cwt., and that gas is also shortly to be increased in price?

Mr. RUNCIMAN: I cannot possibly answer questions with regard to the price of gas in the East End of London without notice. These vessels, I understand, have been let at the maximum rate of 11s. I cannot say without notice what is the present rate; but I understand that before they came on the market as much as 13s. 6d. was paid.

Sir FORTESCUE FLANNERY: Is it not the fact that the Admiralty are only paying 4s. a ton for vessels commandeered instead of these particular vessels?

Mr. HARRY LAWSON: How are the market rates ascertained by the Board of Trade?

Mr. RUNCIMAN: They are not ascertained by the Board of Trade, but by managers appointed by the Department for the fixing of these vessels in the North; and the usual exchange methods are adopted for ascertaining what the market rates are.

On Thursday a debate was opened, on a motion by Mr. Ferens, on the subject of the rise in the cost of the necessaries of life consequent upon the war. Mr. Asquith made a long speech, in the course of which he referred to the increased cost of coal and freights, and stated that, in addition to the setting free and putting to work of twenty vessels which had been captured and interned, it was hoped that in the course of the present week fourteen more would be released. The statement was received with cheers. This subject is dealt with in a preceding portion of the "JOURNAL."

The following progress has been made with Bills:—

Bills read a second time and committed: Ammanford District Council, Barnoldswick Water, Bury and District Joint Water Board, Chelmsford Corporation Gas, Lincoln Corporation, Lurgan District Council.

Petitions have been presented against the following Bills:—

Ammanford District Council, by the Carmarthenshire County Council and Lord Dynevor.

Barnoldswick Water, by the West Riding County Council, the West Riding Rivers Board, the Aire and Calder Navigation, the Keighley Corporation, the Earby Urban District Council, the Earby Water Company, the Kelbrook Water Company, the Skipton Rural District Council, the Midland Railway Company, and John Wilkinson.

Chelmsford Corporation Gas, by the Chelmsford Rural District Council and the Chelmsford Gas Company.

Dewsbury Corporation, by the West Riding County Council.

Doncaster Corporation, by the Sheffield Corporation, the Edlington (Yorkshire) Land and Development Company, and the Great Northern Railway Company.

Lincoln Corporation, by the Bracebridge Urban District Council, the Branston and Welton Rural District Councils, and J. W. Fisher and others.

London County Council (General Powers), by the Gas Light and Coke, South Metropolitan, and Commercial Gas Companies, and the Metropolitan Water Board.

London Electric Supply, by the above-named Gas Companies and the Water Board, together with a large number of local authorities and other parties affected.

Lurgan District Council, by the Down County Council.

Metropolitan Water Board, by the Corporations of London and Hertford; the London and Middlesex County Councils; the Battersea, Camberwell, Lambeth, and Lewisham Borough Councils; the East and West Molesey, the Esher and the Dittons, the Maldens and Coombe, the Merton and Morden, and the Surbiton Urban District Councils; the London and South-Western Railway Company; and the London, Brighton, and South Coast Railway Company.

Skegness Gas, by the Skegness Gas Company.

Weardale and Consett Water, by the Durham County Council and the Durham Corporation; the Bishop Auckland, Crook and Whickham, Shildon, and Tow Law Urban District Councils; a number of Rural District Councils; the Ecclesiastical Commissioners; the Weardale Lead Company; the North-Eastern Railway Company; and John Etherington Milburne.

Long Service and a Presentation.

Some two years ago, when Mr. James Kerr completed fifty years in the service of Messrs. J. & W. B. Smith, the occasion was marked by a dinner; and, presiding on that occasion, the late Mr. J. G. Watkinson (then the principal of the firm) remarked that their Mr. W. D. Cork would in another couple of years also have served the firm for half-a-century, while the same year would mark his own 25 years' connection with the business. The time then referred to has now arrived; but unfortunately Mr. Watkinson has not lived to see it, his death having been recorded in the "JOURNAL" for May 12 last. Mr. Cork, however, is still "in harness," representing the firm in London as traveller; and last week his jubilee of service was celebrated, though not, owing to existing circumstances, in the same manner as was Mr. Kerr's. On Thursday, in the Farringdon Road show rooms of the firm, in the presence of the staff and employees, Mr. Frederick Watkinson (who has succeeded his brother as head of the firm) presented Mr. Cork with a handsome illuminated address and a substantial cheque; these gifts being accompanied by the heartiest good wishes of all present. Congratulating Mr. Cork on the completion of fifty years' service, Mr. Watkinson added the hope that they might have him among them for a number of years to come. Mr. Cork made suitable response. In connection with these records of long service, it is interesting to note that the firm itself has now been in existence for over three-quarters of a century; for it was in 1839 that Mr. John Smith started it in Edinburgh. Subsequently a move was made to Leith, where he remained for seventeen years, and then came to London. Upon the death of Mr. John Smith, the business was carried on by Mr. W. B. Smith, who had previously been taken into partnership by his brother; and later Mr. J. G. Watkinson joined the business, of which in course of time he became sole proprietor. This is a record which may be held to fully justify the claim of the firm to the title of the "British House."

New Mills Gas Undertaking.—At the last meeting of the New Mills Urban District Council it was announced that the Local Government Board had sanctioned the borrowing of £6988 for gas-works purposes—namely, £6100 for a new gasholder, £500 for services, £238 to defray excess expenditure on buildings and machinery, and £150 for land.

Record Sale of Gas at South Shields.—In their report for the past year (to be submitted to the shareholders on Thursday), the Directors state that the sale of gas—namely, 599 million cubic feet—exceeded all previous records; being an increase over the previous year of 39 million cubic feet, or 7 per cent. The increased revenue from gas was £4061; but against this there was a decrease in the receipts from residuals of £5938. The reconstruction of the Jarrow works has been pressed forward; and though it is not completed, gas is now being made at Jarrow with the new plant. The revenue amounted to £110,234, and the expenditure to £87,945; the total balance available (including the sum brought forward, &c.) being £41,653. After the payment of interest on mortgages and dividends at the rate of 8½ per cent. per annum on the consolidated and new stocks and 5¾ per cent. on the ordinary stock (both less income-tax), there will be a balance of £20,564 to carry forward.

LEGAL INTELLIGENCE.

SWANSEA LIGHTING AGREEMENT DISPUTE.

SUPREME COURT OF JUDICATURE—COURT OF APPEAL.

Friday, Feb. 12.

Before THE MASTER OF THE ROLLS, *Lord Justice* PHILLIMORE, *and Mr. Justice* JOYCE.)

Swansea Gaslight Company v. Swansea Rural District Council.

This was an appeal fromt he decision of Mr. Justice Warrington, dismissing the action with costs.*

Mr. GEORGE CAVE, K.C., and Mr. PERCY WHEELER (instructed by Messrs. R. W. Cooper and Sons) appeared for the appellants; Mr. A. C. CLAUSON, K.C., and Mr. TOMLIN, K.C. (instructed by Messrs. Lees and Co., Agents for Mr. Edward Harris, of Swansea) represented the respondents.

The action was brought for a declaration that an agreement of Nov. 5, 1909, with reference to the lighting of a certain part of the district, was still in force and binding on the parties, and for an injunction to restrain the breach by defendants of a clause in the agreement the effect of which was to prevent the Council from setting up in certain places electric light in competition with gas lighting. Defendants alleged that the agreement was *ultra vires*, and not binding on the parties. It appeared that under an Act of 1861 plaintiffs had the power of supplying gas within certain limits; and in 1908 the Council obtained a Provisional Order authorizing them to light Llansamlett by electricity. The Council desired to have certain portions of their district, not already lighted by gas, lighted by electricity. The Company being willing on certain terms to provide for the lighting of these districts, the agreement in question was made. The agreement recited that the Council were desirous of making provision for the lighting of the highways and streets within the parishes of Llansamlett and Chase Rural, and that the Company were willing to supply the gas, and it was agreed: (1) That the Company would forthwith extend their mains to certain specified roads; and (2) that the Gas Company should not be called upon to extend their mains to any road, street, or place beyond those mentioned in article 1, unless certain conditions were fulfilled, and that upon these conditions being fulfilled the Company would, with all reasonable despatch, proceed to make the extensions. Article 16 provided that the Council would not, during the continuance of the agreement, put in force the powers conferred upon them by the Llansamlett Electric Lighting Order, 1908, so far as the supply of electrical energy for street lighting, private consumers, &c., within the portion of their district agreed to be lighted by gas under the provisions of the agreement was concerned; and also that they would not, during the same period, substitute any other modes of lighting for gas in the district served by the Company. But nothing in the agreement should operate to prevent the Council at any time putting into force the Order for power purposes. It was urged on behalf of the Council that the agreement was *ultra vires*, because it provided for the extension of mains to places which at the time the agreement was made were outside the district. But Mr. Justice Warrington found that it was not, though they were right in saying that clause 16 was not binding on them, as it prevented a local authority from divesting itself of any legal power. The Council further said that, granted the agreement was valid and binding, it had, by mutual consent, been superseded and put an end to by a further agreement made on the occasion of the promotion of the Provisional Order extending the district. After hearing the witnesses on both sides as to what took place on the occasion in question, the learned Judge found that the agreement had been superseded, and entered judgment for defendants, with costs.

Mr. CAVE, for the appellants, contended that the agreement had not been superseded by an arrangement entered into by the Parliamentary Agents, and asked the Court to make a declaration that the agreement was still in force, except clause 16, so that the Gas Company might have the benefit of it for the next 25 years.

Mr. CLAUSON, for the respondents, said the action was really brought with the object of preventing the Council from lighting by electricity a district called Birchgrove. At the time the agreement of November, 1909, was entered into the Gas Company had no power to supply gas in the district to which the agreement applied—the whole thing was outside law and parliamentary power altogether. The root and substance of the case was this: The agreement having been entered into, the Gas Company were minded to get their districts extended, so that they should have power to supply all over the district. They therefore applied to the Board of Trade, who made a Provisional Order which contained quite absurd provisions, enabling a 3s. 6d. rate to be charged in the borough and 5s. outside. Accordingly, the Council opposed it, as they took the view that if the Order was obtained it would confer statutory power to charge the 5s. rate everywhere. The Bill being opposed, representatives of both parties met outside the Committee-room and put their heads together, with the result that a compromise was arranged. On the balance of the evidence it was plain that the question of whether the agreement of 1909 should be torn up was expressly considered. He agreed that the learned Judge in the Court below was not satisfied that an express agreement was made outside the Committee-room; but he certainly came to the conclusion, on the evidence and the documents, that it was impossible to suppose that any one was contemplating there should be any further lighting under the agreement of 1909 after the Committee-room was left. Everyone contemplated that, after the Bill had been passed in the agreed form, no one should afterwards rely on the agreement that had been come to in 1909.

* See "JOURNAL," Vol. CXXVI., p. 807.

Monday, Feb. 15.

Mr. CLAUSON, having read the evidence given in the Court below, and called attention to several authorities, submitted that the agreement of November, 1909, had been put an end to, and plaintiffs were not entitled to the declaration asked, as there was no allegation of any breach.

Mr. TOMLIN followed on the same side, and said the Court had to weigh two stories for the purpose of determining which one was true. The stories might be tested in two ways—one, by reference to the circumstances in which the alleged agreement was made to see how they fitted in with the actual facts, and, next, by reference to the oral evidence. His contention was that there was an express agreement for cancellation of the agreement of 1900. What were the facts? The Gas Company had a Bill in Parliament which the Council were opposing; and the opposition was withdrawn upon terms. But what were the terms? The Council said one term was that the agreement of November, 1909, should be put an end to; and for the Gas Company it was said the term was that there should be a variation in the agreement embodied in the Order. What were the probabilities when one considered the facts? The Company had the right to charge the maximum of 3s. 6d. in the borough and 5s. within a mile outside; and after the agreement was executed they took steps to obtain a Provisional Order extending the limits. The contention of the Council had always been that if the Company extended their area they should be put under compulsion to extend the mains in the added district, and to charge the same rate as in the borough. The story told by the Council was consistent with all the documents, while that of the Gas Company was inconsistent; and therefore the declaration asked for ought not to be granted.

The hearing was adjourned.

Accident at a Tar Distillery.

At the Manchester County Court last Tuesday, a Manchester woman whose husband died following a simple accident sustained at his work, was awarded the sum of £250, with £14 14s. costs, under the Workmen's Compensation Act. On behalf of the applicant, Mrs. Bates, it was stated that her husband was employed by Messrs. Hardman and Holden, Limited, tar distillers, of Miles Platting; and on Nov. 19 last he met with an accident, which seemed to be a very trivial one at the time. He merely scratched his middle finger; but after being laid up for a few days (as he thought with influenza), he died on Dec. 4 from blood poisoning. It was mentioned that the full amount of compensation the widow (who was 65 years of age and a total dependant) would be entitled to under the Act was £287; but there was some delay in giving the requisite notice to the respondents. In these circumstances, an agreement had been come to between the parties for the payment of £250 compensation and costs.

Tampering with a Meter.

Before the Belfast Magistrates, George Sloan was summoned by the Corporation for having tampered with his meter so as to prevent it from registering the quantity of gas consumed. Evidence was given by Corporation gas officials showing that an india-rubber tube had been connected between the service-pipe and the house-pipe, so that the meter did not register the quantity of gas used. Defendant admitted having made the connection between the pipes, but denied that anything fraudulent had been attempted. The gas in the house, it was said, was continually going out, and the department had promised to send up a new meter on the day following that on which defendant's wife had made a complaint. No meter, however, was sent up, and the defendant fixed the pipe complained of in order that they might not be left in darkness, The fittings and everything used had been left for the inspector to see when he called. Defendant is a plumber and gas-fitter. The Chairman said it was a very serious offence to tamper with a gas-meter. It would never do if people were allowed to help themselves to the Corporation gas; but as there was something to be said in defendant's favour in the present case, he would only be ordered to pay 11s. 6d. compensation. Defendant agreed to pay the sum mentioned, and was discharged with a caution.

Walsall Lighting Reduced.—The authorities at Walsall have taken steps to reduce the public lighting in accordance with the views of the Home Secretary, who agreed with a suggestion made by the Chief Constable of Birmingham that, in view of its contiguity to that city, Walsall ought to put a lighting order into force similar to that in Birmingham. Last Thursday night the centre of the town was very dimly lighted, most of the electric arc lamps being out of use; while on the main thoroughfares leading out of the town every alternate gas-lamp was extinguished. Tradespeople have been served with notices requiring them to darken outside lamps on the street side.

Reading Gas Company.—The accounts of this Company for the year ended the 31st of December show a balance of net profits of £41,149. Interim dividends at the maximum rate of 5 per cent. per annum for the six months ended the 30th of June were paid on the 1st of September last; and the Directors recommend dividends at the same rate for the past half year, less income-tax. The sales of gas during the first half of the year continued to show a substantial increase; but the interruption of business caused by the war has manifested itself in some respects. At the same time, the use of gas for cooking, heating, &c., has advanced very satisfactorily. In competition with the Reading Electric Supply Company, Limited, the Directors were successful in obtaining the Reading Corporation contract for the public lighting for a period of ten years. As a result of the increased consumption of gas, the Directors entered into contracts in the earlier part of the year for considerable extensions, including a new 2 million cubic feet gas-holder, in the construction of which good progress is being made. After the forthcoming annual general meeting, the proprietors will be asked to sanction an increase in the capital of the Company.

MISCELLANEOUS NEWS.

SOUTH METROPOLITAN GAS COMPANY.

The Ordinary Half-Yearly General Meeting of proprietors was held on Wednesday last at De Keyser's Royal Hotel, Victoria Embankment, E.C.—Mr. CHARLES CARPENTER, D.Sc., in the chair.

The SECRETARY (Mr. F. M'Leod) read the advertisement convening the meeting, and the minutes of the last ordinary general meeting.

The seal of the Company having been affixed to the "Register of Proprietors," the report and accounts [which have already appeared n the "JOURNAL"] were taken as read.

THE CHAIRMAN'S SPEECH.

The CHAIRMAN: Ladies and gentlemen,—We are meeting to-day under circumstances the gravity of which was, I fear, but feebly realized by us six months ago. The nearest parallel in our own particular history dates back a quarter of a century, when we were emerging successfully from an industrial struggle—happily more or less a local one, though at a great cost, shared by shareholders and consumers alike, in maintaining our obligations of supplying South London with gas. We have since enjoyed the blessings of the settlement which followed; and I am sure the hope is deep-rooted in all our hearts to-day that our Empire will soon rise triumphant from the titanic warfare in which it is concerned, and that peace may once more reign among the great nations of the earth.

THE WAR AND THE GAS INDUSTRY.

I suppose there are two daily questions which all of us who are concerned with industry never fail to ask: First, how is the war going? Second, how is it affecting our business? It is to the latter that I propose to ask your attention this afternoon. As regards the half year just closed, the first paragraph of the report states the matter pretty concisely. We began with something like £27,000 in hand; and this has practically all disappeared—being largely accounted for by the substantial decrease of business. We had prepared for something very different. We had every reason to believe last spring, from the reports of those mainly responsible for the commercial side of our undertaking, that we should have a record year; and we provided accordingly. You will not be surprised to be told that these preparations, like those in many other businesses, have to be made a long way in advance, so that we may be fully prepared to meet the demand made upon us when it arises. Instead of an increase in business, we have had a falling-off of over 4 per cent.; and we had, therefore, provided plant which turned out to be something like 10 per cent. beyond requirements. The result must be obvious, and it seriously affected our economy of working. This, in itself, was bad enough. But we had to bear, in addition, the burden of the reduced values of residuals. Coke prices were poor; and we were feeling in sulphate of ammonia the result of increased production on the Continent. Our great difficulty, however, is with regard to tar—the chief product from which is pitch. Belgian trade is, of course, at a standstill; and, although pitch is wanted badly elsewhere on the Continent, our friends do not see their way to accept the present enormous charges for freight. We cannot stop the production of pitch, without at the same time ceasing the manufacture of those other products which are absolutely essential for the Nation's needs. Fortunately, pitch is not injured by storing; so we have gone on unchecked with our manufacture, so as to maintain undiminished the output of the essential products. We are also devoting both time and money in endeavouring to increase our yields. I am pleased to record here the fact that one gas company with whom we have an agreement for supply has willingly accepted a lower quality of product; so that the whole of our highest testing production is available to meet the requirements of the Government, with whom (directly or indirectly) we have secured contracts. I shall deal presently with our attitude as regards prices asked.

THE CARPENTER-EVANS PURIFICATION SYSTEM.

The third paragraph of the report mentions the continued success of the purification system we substituted for lime. In the current half year we shall complete plants at two other of our works, which will effect in addition a further saving in our purification costs. We believe that the purer our gas is, the more its convenience will be recognized by its users.

LONDON'S ELECTRICITY BILLS.

I must now say a word or two with regard to the opposition we considered ourselves bound to offer to two Bills dealing with the supply of electricity to London—one of which, however, has since been withdrawn. If you will refer back to your file of accounts, and look at the accompanying report dated July, 1902, you will find reference to the attitude adopted by Parliament with regard to the subsidizing of electrical undertakings from the rates. Parliament in the Acts granted to two Borough Councils in London then laid down the wise stipulation that, after the first year of working, an estimate is to be made every year of the probable total expenditure; and such a charge is to be made for "the supply of energy that, as far as is reasonably practicable, the revenue for that year shall not be less than the expenditure for that year." Now I am sure in times like these the London ratepayer does not want, in addition to his present responsibilities, the chance of contributing to a rate-in-aid of the electrical undertakings, whether run by borough councils or by companies. Whether the London householder, or shopkeeper, or manufacturer, or street authority, requires either light, heat, or power, his wants can be met from the gas-mains or electric cables, neither having a monopoly of utility. All we ask is a fair field and no favour, and that both systems of supply should be run upon fair though competitive lines. The dreams of cheap electricity, based upon experience derived from places adjacent to coalfields or waterfalls, cannot possibly be realized in London. The real difficulty has arisen from the desire to increase the output regardless of cost. I will give you one example of this, drawn from a somewhat extended experience. The Borough Council go to a large consumer of gas, and ascertain by an examination of his accounts how much he pays per annum for gas, and then offer to supply all the current required in substitution at a price per unit specially worked-out to come lower than the cost of gas. How is it possible for a business to be run commercially upon such uncommercial lines? The average ratepayer naturally wants to get his current, as all his other requirements, as cheaply as possible; but I cannot imagine him looking with favour upon the idea of making him responsible for loss through the medium of his rates. Electric supply has had the enormous advantage of being founded and carried on by men trained in science. Gas supply, founded in comparative darkness at the beginning of the last century, has only in its later years taken free advantage of such resources. Both can well be left to work out their destinies unaided by the rates. While upon this subject, I would like to express the satisfaction with which we regard a recent decision of the Court of Appeal. It has been therein laid down that an electrical authority is given statutory powers to supply current, not to smash a gas company—a sufficiently substantial difference, but one which many suppliers seem to have overlooked.

COAL SUPPLY TROUBLES.

But, ladies and gentlemen, all these matters are more or less ordinary ones—they represent the ups and downs, the troubles and difficulties, inseparable from any industrial undertaking. The anxiety which overrides everything with us at the present time is in relation to our coal supply. Now it is not with regard to our dividends that I am at the moment mainly concerned, though there is a great deal of lamentable ignorance upon this subject. My own case may serve as well as any other as an illustration of the baselessness of the charges so often levelled against gas dividends. I have invested a considerable proportion of the savings of my life in this Company's ordinary stock; and if you presently pass the dividend resolution I shall be entitled to a return on my outlay of almost 4¼ per cent. per annum. I think I have said enough to dispose of any suggestion as to extravagant dividends. Now our position with regard to coal is this. About 80 per cent. of the ships we chartered to bring us coal have been taken by the Admiralty for the purposes of the fleet. We make no complaint as to this; for the Nation's defence requirements must be paramount. We did strongly feel, however, that the interned steamers—viz., those belonging to the enemy lying at our various ports—should be available in their place. They are, of course, not so suited for the purpose, as our own have large hatchways to facilitate filling and emptying; and it is just this quality which makes them so suited to the Navy's use. Well, this matter was at last settled, and a certain number of the ships were allocated for the carrying of supplies to London and the South. Of course, we did not expect to get them at the prices ruling in normal times. For one thing the ships' rate of carrying capacity is less, as they can only travel during the hours of daylight; and there have been some occasions when, owing to mine dangers, their running has been altogether suspended. The insurance rates for the hulls are also higher by reason of war risks; and the same cause has resulted in higher wages being asked and given to seamen. We offered 5s. per ton as a fair price; and you may judge our feelings when the Government said we must compete with a market already inflated out of all proportion. An extra cost of freight of 1s. per ton of coal means as nearly as may be 1d. per 1000 cubic feet on the price of gas. It becomes then quite an easy thing to calculate what these high freight charges must necessarily entail. Let me put this question to you. What are the principles which should guide our business dealings in this time of National crisis? Are we to take advantage of the country's needs, and wring the uttermost farthing from those who need what we produce, or should we be content with a fair, and even liberal, payment for what we have to sell? If the latter view is right, then the Government have set the whole country a bad example—I might even go further and call it a pernicious one—in the manner they have handled this question of freights. We ourselves produce products which are urgently required for the country's defence; but we have sold them for this purpose at a fair price and not an outrageous one; and we have absolutely declined to have anything to do with a combination or ring to force-up prices. We have supplied the article at a fair and reasonable price. Is that the principle on which we ought to conduct our business? Your Board say that it is. [Hear, hear.] I am glad to hear that expression of your opinion. If it is the right principle, then the Government have set us a very bad example in the principle they have adopted. The Government have already sanctioned some startling exceptions to universal dependence on the so-called law of supply and demand; and the present instance is certainly one to which they might profitably give attention. I do not grudge profit, and liberal profit, to those who have ships for hire. But I do not forget that London pays a very large proportion of the taxes which have provided our magnificent navy, and which in turn enables our merchant ships and colliers to keep the seas.

THE COMPANY'S EMPLOYEES AT THE WAR.

In conclusion, I desire to supplement in a few words the acknowledgment the report makes to the grand response that our employees gave to the call made for the defence of the land. Not the slightest pressure has been put upon a single person to go and fight or to remain behind—all have been absolutely free to do as they desired. We have not had a single recruiting officer on the works, nor a single Member of Parliament to make a recruiting speech. The high position we have taken in this matter among the Metropolitan Companies is, I am convinced, largely due to the fact that we have practised co-partnership for upwards of five-and-twenty years; and our men have learned therein to think of something beyond self. In proof of this, let me say I personally received some hundreds of letters last Christmas and early in the New Year from many of our men serving His Majesty on sea and land; and it is wonderful how the spirit of co-partnership is manifest in expressions which find utterance in nearly every letter. I must make another acknowledgment before I sit down. In one letter I received from the front, the writer says: "It does us good to feel you are doing your bit at home, while us 'Tommies' are doing our bit in the trenches." If we cannot all fight, we can help to bear the home burdens of those who can and are. Our depleted staff have, from the highest to the lowest, responded cheerfully and ungrudgingly to the

exacting demands made upon their time, their comfort, and their purses. They have taken over a large share of the absent ones' duties; they have formed a strong Committee to look after the wants of their families and dependants; and last, but not least, they are making a substantial contribution to the allowances, in many cases inadequate, provided by the State. They have acted nobly, and once more have proved that "Peace hath her victories" as well as war. I beg formally to move:

"That the report and accounts now presented be received and adopted, and the report entered on the minutes."

The DEPUTY-CHAIRMAN (Mr. Frank Bush): I beg to second the proposition.

The Government and Dyestuffs.

The CHAIRMAN: If any shareholder has any remarks to make, we shall be glad to hear them.

A PROPRIETOR asked in what position the Company stood in regard to the steps being taken in this country to produce aniline dyes.

The CHAIRMAN, in reply, gave particulars of the dye-making process and mentioned that early last spring the Board gave some consideration to the intermediate products necessary for the dyes. On the outbreak of war, the shortage of the intermediate products became so apparent that they went more fully into the matter, and the result was that they now had a working agreement under which they were to make certain specified quantities for the dye manufacturers in the country. He would like to say that there were some extremely able and intelligent men in English firms concerned with the industry—quite as good as those connected with German firms. He added that the Company were well advanced in the manufacture of these intermediate products.

The resolution was then put, and carried unanimously.

The Dividend.

The CHAIRMAN: I have to move:

"That a dividend at the rate of £5 4s. per cent. per annum be now declared, and that the warrants be transmitted to the registered addresses of the proprietors by post."

I need not say much with regard to this, except to give any shareholder, who may be present for the first time, the reason for the reduction in the dividend. It is due to the increase in the price of gas from 2s. 2d. to 2s. 4d. As we are a sliding-scale Company this increase automatically carries with it a decrease in the dividend.

Mr. JOHN MEWS: I beg to second the resolution. Perhaps the Chairman will allow me to say a few words in corroboration of his statement, because I feel that it is a very important thing, not only for us shareholders, but to all our consumers, and also to all the British public, to understand the wrong which has been done to us, as a Company, by the withholding of ships from us for such a long time. The ships have been interned since the beginning of the war. Our ships were taken from us at the commencement of the war, and we have been living on coal supplies obtained before—possibly because we had some idea of trouble. At all events, we had large stocks, and the country ought not to treat us in this way by taking our ships from us and not giving us others to carry coal from the North. The interned ships were not doing anything; and it was only owing to the pressure brought to bear on the Government that they let them come out—ships which have not cost them a penny. And yet what do they charge for rates? Is it not perfectly appalling to find that the Government are raking-in four times, or I will say three times, the amount we ought to pay in respect of these ships? What will happen? If they do not alter their ground, you will have to pay more for gas, the shareholders will receive less dividend, and the poor people who are asking for coal will have to go without it. Is that a position the Government should take up?

The resolution was then put and carried.

Re-election of Directors and Auditor.

The CHAIRMAN: I have now to move—"That Mr. John Ewart be re-elected a Director of this Company." Mr. Ewart has sat longer on the Board than any other member of it; and I can conscientiously say that there is no one to whom we look up more highly than we do to Mr. Ewart.

The DEPUTY-CHAIRMAN: I have much pleasure in seconding the resolution, and I can truly say we are indeed fortunate in having such a gentleman on the Board. Mr. Ewart is a highly respected merchant in the City of London; and his experience has been of great value to the Board. His family has been connected with the Company almost from the beginning, and I notice that his uncle is mentioned in our reports in 1832 as being one of the original shareholders.

The resolution was carried unanimously.

Mr. JOHN EWART: I am very much obliged to the mover and seconder for the kind words they have uttered, and to the shareholders for re-electing me. I have now served on the Board for thirty-six years; and consequently my experience carries me back beyond the period of the strike. I can only say that this last half year has been one of great anxiety and worry, such as we have not had since the great strike. However, we have pulled through under the able guidance of our Chairman, our excellent officers, and the goodwill and heartiness of our men; and I do not see why we should not continue to flourish as we have done in the past.

The CHAIRMAN: I beg now to move: "That Mr. John Mews be re-elected a Director of this Company." It is a curious thing—I hope you will not think it is from any want of language on my part—that what I have said of Mr. Ewart applies equally to Mr. Mews, who is an old colleague of ours.

The DEPUTY-CHAIRMAN: I beg to second the motion. We are exceedingly fortunate in having Mr. Mews on our Board, as by profession he is a barrister and is also well versed in banking matters.

The resolution was carried unanimously.

Mr. JOHN MEWS: I am very much obliged to you for this vote of confidence. I had hoped the Chairman would have put the two names together, when you would have only had one speeeh. Perhaps, however, you will allow me to reiterate what Mr. Ewart has said.

A SHAREHOLDER: I beg to propose—"That Mr. Charles Mortimer be re-elected an Auditor of the Company."

Mr. D. T. POWELL seconded the motion, which was put and carried.

The CHAIRMAN: I am informed that Mr. Mortimer is unwell and not present, so he will not be able to thank you for the honour of his re-election.

Votes and Thanks.

Mr. EDGAR said he had much pleasure in proposing a hearty vote of thanks to the Chairman, who had so ably conducted the proceedings, and to the Board of Directors for the successful issue of another half year. It was impossible to exaggerate the amount of work the war had entailed upon the Directors, owing to the large number of their best workmen going to the front; and it was a proud moment when they saw recorded in the "Daily Mail" the names of those who had gone to the front to do their bit in the time of need. The half year under review reflected great credit on all concerned, taking into account the enormous reduction in public and private lighting and the reduction in the number of consumers. He had much pleasure in proposing that the best thanks of the meeting be accorded to the Chairman and Directors for their services during the past half year.

A SHAREHOLDER: May I be permitted to second the resolution.

Another SHAREHOLDER: I should like to support it, and to include the staff as well; for if they did not assist us, where should we be?

The resolution was put and carried unanimously.

The Officers and Staff.

The CHAIRMAN: I thank you on my own account and on behalf of my colleagues for this renewal of your confidence in us. When one has finished speaking on an occasion of this kind, one often feels he has left unsaid what should have been said. There does exist, and always will exist, a considerable amount of misapprehension with regard to conditions under which a gas undertaking carries on its business. I had a letter from a member of Parliament, who had been approached by a constituent with regard to the coal question, in which he said: "The gas companies have themselves to blame a great deal, because they have for years past put English and German coal in competition, and encouraged German steamers to come into the River Thames. At the outbreak of the war I understand they had contracts for 400,000 tons of German Westphalian coal, which they have had to replace." This is only worthy of German Head-Quarters bluff. It is quite true we did buy a cargo of German coal. It was offered to us, and we are always ready to try experiments; and it may interest you to know that it turned out very badly. I may take this opportunity of correcting an impression on some people's minds that our requirements are based on German productions. Nothing of the kind. Bearing on this question, I may touch on another matter. A tremendous lot of incandescent burners have been imported from the Continent. For years we have done all we can to encourage British manufacture, as we felt that it was our duty to do so—and after all British manufacturers want encouraging, as in some respects they are not so quick as the Germans in looking ahead. We have tried to be patient with British manufacturers, and to help them with plant to make our requirements on a limited scale. However, I am transgressing. I thank you very heartily for your continued support. Before I sit down I should like to take up the suggestion that was made—that we should not forget the staff. They have behaved admirably. It would be easy to expand the paragraph in the report which refers to them, but I will not do that now. I beg to propose a hearty vote of thanks to the staff for what they have done, and are continuing to do, for the Company, shareholders, and consumers.

A SHAREHOLDER, in seconding the motion, said he observed it mentioned in the report that 22 per cent. of the workmen had gone to the front, or one in five; so that if the four were doing the work of five they must either be working overtime or overhard, and consequently deserved thanks.

The CHAIRMAN: They are doing both; and I am afraid I have not reckoned the number who have been sworn in as special constables, and are guarding our works. Our thanks are due to them also.

The resolution was put and carried.

The CHIEF ENGINEER (Mr. W. Doig Gibb) returned thanks on behalf of the staff. He said the staff would be able to do little or nothing without the help of the workmen. They rowed together hand in hand for the best interests of the Company, and this had never been shown more clearly than when they were faced with the war. He was sure the men would take their share in the larger field of winning through.

The SECRETARY (Mr. F. M'Leod) begged to thank the meeting on behalf of the clerical and commercial staff. He highly valued the remarks which had been made, as praise from a shareholder was always gratifying and encouraging. Where everybody had done so well, it would perhaps be invidious to particularize. An outdoor staff actuated by an intelligent zeal was of the utmost importance, and in this direction no company could be better served. The same might be said of those engaged indoors; and on behalf of all he thanked them for the vote.

The proceedings then terminated.

Unusual Dividend Recommendation.—At next Monday's annual general meeting of the Exeter Gas Light and Coke Company, the report to be submitted states that the sale of gas last year showed an increase of 28 million cubic feet over 1913—realizing in all £47,381. The Directors mention that the inhabitants of Pinhoe having expressed a desire for a supply of gas in the district, the necessary mains were laid last summer; and it is hoped that the added area will prove a source of profitable revenue. It is also said that they "have been reluctantly compelled to increase the price of gas from 2s. 4d. to 2s. 6d. per 1000 cubic feet from Christmas last, in consequence of the heavy increase in the cost of manufacture brought about by the war." When, however, the normal expenditure is again reached, "they hope to be able to revert to the original price." The Board recommend the payment of the usual dividends—at the rate of 10 per cent. on the £40,000 of original stock, and of 7 per cent. on the £46,500 of new ordinary shares, "together with such additional dividend as will reimburse the shareholders the deduction for income-tax on the dividends payable."

SOUTH SUBURBAN GAS COMPANY.

The Ordinary Half-Yearly Meeting of the Company was held last Friday at De Keyser's Royal Hotel, Victoria Embankment, E.C.—Mr. CHARLES HUNT, M.Inst.C.E, presiding.

The SECRETARY (Mr. Wilfrid Wastell) read the notice convening the meeting; and the Directors' report and the accounts were taken as read.

EXPERIENCES DURING THE FIRST MONTHS OF WAR.

The CHAIRMAN, in moving the adoption of the report and accounts, said: The first paragraph of the report gives prominence to the effect which, in its first period as measured by the recurrence of these meetings, the war has had on the operations of this undertaking. At the time of our last half-yearly meeting the hope, rather than perhaps the expectation, was entertained that a rise in the price of gas might not be necessary—thanks to the relief that had been secured by the current year's contracts for coal. Fresh circumstances, however, arose, against which it was quite hopeless to contend; and the accounts furnish a complete justification for the advance of 2d. per 1000 cubic feet which, with the greatest reluctance, the Directors felt compelled to announce last September. The revenue account shows that, in receipts for residuals, there is a falling off representing no less than 3·6d. per 1000 cubic feet, as compared with those for the corresponding period of the previous year, and more than wiping out the saving effected by the new contract prices for coal. On the other hand, it is a matter for congratulation that the gas sales show by comparison no falling-off for the half year, despite the extensive curtailment of public lighting, the total prohibition of outside shop lighting, and the shrinkage of private consumption due to war conditions—a combination of circumstances which completely neutralized in the December quarter a very gratifying increase which had been experienced earlier in the half year, and seemed likely to have a deterrent effect upon gas consumption for some time to come.

GAS PRICES AND THE UNDIVIDED BALANCE.

After debiting to the special purposes fund, with the approval of the Company's Auditors, the war charges on coal, the amount available for distribution is sufficient to pay the full dividends to which the proprietors are entitled according to the present price of gas, and to carry forward to next half year the modest sum of £129. This compares with £1280 brought forward from last half year, and is therefore a reduction of £1151—the reduction a year ago having been upwards of £7000. Had it not been for the limitation to £20,000 imposed by the Company's Act of 1893, the undivided balance might in later years have been brought up to an amount that would have enabled the recent increase in the price of gas to be avoided, or at all events postponed. Fortunately for the future—as it should prove—this limitation was considerably enlarged by the Company's Act of 1912; but there is really no necessity for any limitation at all. Obviously a substantial carry-forward is desirable, as helping to avoid temporary increases in the price of gas, and consequent inconvenience to consumers; and there is not the least temptation to exceed the bounds of prudence in this respect—it being to the direct interest of all sliding-scale undertakings to sell gas at the lowest possible rate.

FAVOURABLE CONSIDERATIONS.

Coincident with the reduced gas output during the last few months of the half year, there continued to be a brisk demand for gas appliances of all kinds; and the proportion of these in use as compared with the number of consumers is now greater than ever. There were also added during the half year 1153 new consumers, so that there has been continued expansion of the business in spite of all adverse conditions. Another encouraging feature is the distinct revival which has recently taken place in the demand for both sulphate of ammonia and coke—the two residuals which in ordinary times bulk most largely in the revenue returns. The first effect of the war was to completely close all markets for sulphate, and to further depress those for coke. But this has now been followed by a somewhat sharp reaction, which, if sustained, cannot but favourably affect the trading profit for the current half year. A good deal of misapprehension continues to exist as to the value of gas coke as a fuel, particularly among steam raisers; and therefore information on the subject can hardly be too widely circulated. Mr. G. M. Gill, of the Commercial Gas Company, has recently stated on the authority of the engineer to a large public institution that 11 tons of coke give as good results as 10 tons of hard steam coal costing 21s. 6d. per ton. Another practical authority gives as the result of three months' trial with two Lancashire boilers that 8 tons of coke are equal to 7 tons of "Welsh" costing several shillings more per ton. Using "slack," the comparison is stated to be as 8 tons of this fuel to 6 tons of coke. These are figures that cannot but appeal to users of fuel for steam-raising purposes, because they show very appreciable economy at present prices in the use of coke if properly applied. Tar has somewhat disappointed the expectations which were founded on its extensive adoption for road-making purposes; and the demand for it is at present still further depressed by the difficulty experienced in dealing with pitch under present conditions. Possibly, however, a revival may be in store in connection with the movement which has been set on foot under Government auspices to establish in this country the dye industries which for so long a period have found their chief home in Germany. Recent announcements on the subject certainly point to the opening-up of a fresh field for activity in connection with tar distillation.

COAL AND FREIGHTS.

The improved market for coke has undoubtedly followed the higher prices unfortunately now ruling for coal, which for some time past has been, and continues to be, most difficult to get. Not only have railways been very seriously congested, but from various causes, which it is not necessary to enumerate, there is not at the present time a sufficiency of vessels to "go round." This hits particularly hard in a case like that of this Company, because we are not yet in the fortunate position of having riverside works, and consequently of being able to run vessels of our own. Relief to some extent has recently been given by the bringing into use for coasting purposes of a few interned enemy vessels. This action on the part of the Government appears to have been prompted by a letter—for which the gas industry, so far as London is concerned, has reason to be grateful—addressed by Sir Corbet Woodall to the Admiralty, calling attention to the seriousness of the position. The first effect of this letter was the appointment by the Government of what is called the London Coal Supply Advisory Committee, on which all the public services in London and the leading coal contractors are represented. It is unfortunate, however, that notwithstanding the strong representations of this Committee, the Government insisted on hiring-out these vessels at the inflated prices of the day—thus to a certain extent stereotyping charges for freight which, if continued in any degree, cannot but result in a further substantial increase in the price of gas. It is, of course, recognized that the Government is bound to take a broad view of this question, having regard to Imperial interests. But the importance of adequate coal supplies can hardly be over-estimated; and it is doubtful whether—ready as all classes are to bear their share of whatever burden the necessities of the time may impose—the consumers of gas may not feel that an increase of several pence per 1000 cubic feet is not a greater one than they in particular ought to be called upon to bear. Especially is this likely to be felt as a hardship when it is realized that nearly the whole of the present enormous advance in freights goes into the pockets of shipowners in the shape of extra profits. It is credibly stated that the additional cost of freights from the North incurred under existing conditions is amply covered by about 2s. per ton; whereas an advance of as much as five times the amount has been claimed. This, it is true, may be regarded as perhaps the high-water mark, since reaching which there has been occasional easement. But so long as freights remain at anything like the present high figures, the position must continue to be a very serious one, since every additional 1s. per ton on freight above 3s. means practically 1d. per 1000 cubic feet on the price of gas. Having regard to the far-reaching effects of these exorbitant freights—for the cost of food is involved in them—it is not surprising that there should have sprung up an agitation for the fixing by Government of maximum rates for freight. But this is a step to be held in reserve as a last resource. Meanwhile, we must, I presume, derive what comfort we may from the remedial measures promised by the Prime Minister last night, among which is the employment of an additional number of interned vessels. It seems probable that had the vessels been made use of earlier, much inconvenience and hardship to the coal consumers of London might have been avoided. The position of this Company with regard to coal supplies has been further aggravated by dependence upon rail as well as upon sea transit; all coal having to be brought by rail from the river landing-stage to Lower Sydenham or Bromley.

THE COMPANY'S PROPOSED NEW WORKS.

As to this, it may be sufficient to say that recent experience further emphasizes the desirability of manufacturing works situated on the river side, such as we contemplate erecting in the not very distant future upon the land recently acquired at Belvedere. With regard to this land, the proprietors will be interested to hear that over a large portion of it the London County Council have been casting longing eyes, and, in fact, scheduled it for compulsory purchase in connection with their huge electricity scheme, a Bill for which was recently deposited. It is hardly necessary to say that the Directors were prepared to offer to this proposal the very strongest opposition in their power; as also to another manifestly unreasonable one which the Bill contained—viz, that any loss resulting from the supply of electricity under its provisions should be chargeable to rates. That is to say, it was intended that gas undertakings should be made to contribute towards the support of a most powerful and active competitor, by helping as ratepayers to make good its losses, even though such losses might have been incurred through its underselling them. However, the Bill failed to secure the necessary majority of the Council, and is understood to have been dropped.

THE BELVEDERE SITE AND THE WEST KENT WORKS.

The Company's Special Act obtained last year authorizes not only the purchase of the land at Belvedere, but also the sale of the old works of the West Kent Company at Erith, and the land adjoining. Both operations have since been carried into effect, and the total cost of the exchange—for so it may be called—including the cost of obtaining the Special Act, is seen by the present statement of capital account to have been £13,604. It will probably be agreed that this is by no means an extravagant amount, especially having regard to the value and importance of this acquisition. Former proprietors of the late West Kent Company will be specially interested to hear that their new retort-house, the shell of which had been almost completed at the time of the transfer, has already been transformed into a bulwark against the country's enemies in the shape of an ammunition factory; while around it this erstwhile peaceful site bristles with similar warlike preparations.

CAPITAL REQUIREMENTS AND CAPITAL RAISING.

The capital requirements of the undertaking since its enlargement have necessarily been somewhat heavy; and the Board has had from time to time to consider very carefully how these can be met to the best advantage. The issue of debenture stock last June would have been followed by another in the autumn had the conditions been then sufficiently favourable. Having regard to the continuance of these conditions, it is not wholly to be regretted that our expenditure on capital account is easing-off; and certainly this is not the time, nor is it our intention, to incur additional liabilities in this respect, so long as the development of the undertaking is not thereby endangered. The suggestion has been made that Government aid should be invoked for the purpose of enabling gas and presumably other similar undertakings to raise capital on terms more nearly approximating to those obtainable in normal times; but this would appear to contemplate some sort of Government guarantee or security, which is hardly likely to be forthcoming. It seems more probable that Parliament would lend a favourable ear to proposals for an increase of borrowing powers, for this is primarily a matter for proprietors to determine. The framers of this suggestion rightly point out that there almost invariably exists ample security for a great deal more debenture stock than what may be called the statutory one-third of the paid-up capital; and having regard to the much greater lattitude in this respect which is not unfrequently enjoyed by other industrial concerns, it does seem that a

good case can be made out for a revision of this rule as applied to gas undertakings. This, however, is, as regards this Company, rather a matter for the future than for the present.

THE CO-PARTNERS AT THE FRONT.

The fourth paragraph of the report is in substance unique in the history of the undertaking. But in the present grave and unparalleled National crisis, the Directors are proud—and, I may say, thankful also—to be able to record the fact that no fewer than 150 of the Company's employees of all grades have joined the forces since the commencement of the war. These have the heartfelt good wishes of us all for their safety and success; while, so far as it is in the power not only of the Company, but also of their fellow-employees, they have been relieved from anxiety both as to their own future, and also as to the welfare during their absence of those who are dependent upon them. All are assured of employment on their return—as far as possible in the places they occupied on leaving; and out of the fund formed by the joint contributions of the Company and the employees, to which also the Directors individually subscribe—for we are all firm believers in co-operation—all the separation allowances granted by Government continue to be supplemented. In the case of one employee who has unfortunately succumbed to wounds received in the ever-memorable battle of Mons, this supplementary allowance has been continued pending the decision of the Government as to permanent allowances to widows and orphans. This decision has now been made known; and the question as to the advisability or otherwise of further contribution by the Company is under consideration. In connection with this subject, it may be mentioned that, within the Company's area of supply, there are 111 Belgian refugee hostels and Red Cross hospitals, all of which have been supplied with gas heating or cooking appliances, and fitted free of charge.

THE DEPUTY-CHAIRMAN.

Mr. Light's retirement from the Board, of which he had been a member for upwards of thirteen years—during six of which he acted as Deputy-Chairman, is a distinct loss to the Company, since his special knowledge of railway traffic was of considerable service. His genial personality, moreover, rendered him a very acceptable colleague; and it was with the greatest regret that the Directors received from him intimation that continued ill-health prevented him from continuing on the Board. They have placed on record their appreciation of his services to the Company and their earnest hope—in which I am quite sure all will join—that he may be spared for many years to come. As successor to Mr. Light, the Directors feel themselves fortunate in having been able to secure the co-operation of Mr. Harold Gundry, who is already proving himself to be a very efficient Director.

OFFICIAL CHANGES.

Two changes on the staff remain to be recorded. Mr. H. J. Heading, our very valued Rental Superintendent and Cashier, has retired after 42 years of faithful and exemplary service, carrying with him the highest esteem of all who were fortunate enough to be associated with him. Mr. J. W. Whimster represents a younger generation. He had served the Company for about twelve years—first as Assistant Engineer and latterly as Works Superintendent. He left at the end of last year to take up the position of Engineer and Manager to the Bath Gas Light Company. He has, I need not say, our very best wishes for his success in that higher and more responsible position.

Mr. H. GUNDRY, in seconding the motion, remarked that, in spite of the difficult times through which the Company had been passing, they could point to certainly satisfactory results. To be able to do so was not easy at such a time as this. Regarding the number of employees who had gone to the front, they were all very proud of them; and looking back at the Company's past success, the Directors and proprietors all felt how much they owed to a loyal staff.

The CHAIRMAN, replying to Mr. H. W. SMITH, said that the land acquired at Belvedere had an area of about 189 acres; and it had an extensive river frontage. The land stretched from rail to river.

The motion was unanimously carried.

The DEPUTY-CHAIRMAN (Sir J. Fortescue Flannery, Bart., M.P.) moved the declaration of a dividend for the half year at the rates of 5 per cent. per annum on the preference stock, 5⅝ per cent. on the ordinary stock, and 5 per cent. on the West Kent ordinary stock, less income-tax. In doing so, he said that he had ventured, in company with other members, to bring forward in Parliament the question of supply of coal to the Metropolis, because it was one which, he did think, had not been dealt with by the Government Department as thoroughly as he hoped it would yet be dealt with in the interests not only of the gas companies, but of gas consumers, and particularly of the poorer among the consumers. What the gas companies desired, and what they thought was fair, was that the Government should, without interfering unreasonably with the market, do something to restore, to the uses and purposes of the carrying of coal to the Metropolis, a proper amount of tonnage drawn from the interned German vessels, to which reference had been made by the Chairman, at some reasonable rate, having some reasonable resemblance to the original rate, and to the present rate for the vessels which were being used for Government purposes and had been withdrawn from the coal trade of the Metropolis.

Mr. W. G. WALLER seconded the motion, which was unanimously agreed to.

RE-ELECTION OF DIRECTORS AND AUDITOR.

The CHAIRMAN proposed the re-election of Mr. B. R. Green to his seat at the Board, remarking that he represented the happy combination of technical and administrative experience which was most valuable at a Board of this kind.

Mr. R. GARRAWAY RICE, in seconding the motion, observed that Mr. Green and himself had been associated a great number of years in the old Mitcham and Wimbledon Gas Company. Mr. Green was the Engineer; and he (Mr. Rice) as Chairman saw a great deal of him. They were also associated on the Board of the West Kent Gas Company. In both these Companies, they had very great confidence in Mr. Green. He was extremely pleased to see him on the Board of this Company, as it made a personal link between the old West Kent Company and this one.

Mr. SAMSON supported the motion, which was unanimously carried.

The CHAIRMAN next proposed that Mr. Harold Gundry be re-elected. Mr. Gundry, he observed, had not been with them long as a Director; but the Board were most satisfied with the selection they had made. He (the Chairman) was quite sure he would prove, as he had already proved, a very valuable acquisition to the Board.

Mr. JOHN BORASTON said he was able to second the motion with some confidence, because it had been his privilege to know Mr. Gundry for at least twenty years. He had summered and wintered with him a good many times. He was known to a good many in that room, because he had been a constant attendant at the meetings of the proprietors; and he had frequently taken part in their discussions, and had invariably shown a keen appreciation of their methods of working. It was good policy on their part to make their Board as representative as possible of all classes of thought and training. He vouched for the honour and integrity of their new Director. He had business ability, combined with great application. He had time to apply to the Company's service; and he had had experience of business administration on the large scale. If he was open to one criticism, it was that he was a lawyer. He (Mr. Boraston) confessed to the proprietors at once, although he was nominally a lawyer himself, that it was quite possible to have too many lawyers on a governing body. But their Company was one of some magnitude; and legal problems of the highest importance constantly came under consideration. There was therefore room, and more than room, for a competent lawyer on their Board.

Both Mr. GREEN and Mr. GUNDRY acknowledged their re-election.

Moved by Mr. A. S. GEDGE, and seconded by Mr. R. T. WRAGG, the retiring Auditor (Mr. E. W. Drew) was re-appointed.

VOTES OF THANKS.

Mr. R. GARRAWAY RICE moved a vote of thanks to the Chairman and Directors. He remarked that they were deeply indebted to the Chairman for the instructive address he had given to them that day. It would enable many who were not quite in touch with the gas industry to appreciate several points that they otherwise would not do.

Mr. H. W. SMITH seconded the motion, which was cordially passed.

The CHAIRMAN returned sincere thanks on behalf of his colleagues and himself. He could assure the proprietors that the present was a very anxious time indeed, and full of difficulties, for directors of gas companies. They would do their best, as in the past. He could not say they would escape having to raise the price of gas again; but this would depend largely on the question of freights. Continuing, he said he should like to acknowledge their great obligation to the officers, staff, and employees from the highest to the lowest, for the devotion and energy they displayed in the Company's affairs. As the proprietors were aware, a large number of the employees had gone to join the forces; and it spoke volumes for those remaining that many had voluntarily undertaken extra work on behalf of their colleagues who were away. Mr. Shoubridge had been with them for some years; and his zeal and energy on behalf of the Company were unquestioned. Mr. Wastell had been with them now for two or three years; and they were perfectly satisfied with the choice they made in appointing him Secretary. The Board and proprietors generally were greatly indebted to both their chief officers; and they were also indebted to all serving under them for their energy and zeal.

Mr. SAMSON seconded the motion, which was heartily adopted.

Mr. BENNETT suggested that some means should be taken to convey to the men at the front the appreciation of the proprietors of their services to the country, together with their good wishes.

Mr. GEDGE seconded this; and it was also adopted.

Mr. SHOUBRIDGE, replying on behalf of the engineering staff, the workmen, and himself, said he thanked the proprietors most heartily for their kind approbation. It had always been cheering and encouraging to them to know the proprietors were satisfied; but at no time was it more so than during the present strain and trial through which they were passing. The Company had fortunately been able, in spite of the great difficulties that had obtained in getting deliveries of coal, to keep up their usual supply of gas, and their reserves of coal, the proprietors would be pleased to learn, would compare favourably with those of most other gas companies. They had had considerable difficulties with which to contend, and there might be others in various ways before them. The proprietors, however, might rely, in perfect confidence, upon the staff and employees doing their utmost in maintaining the efficiency and prosperity of the Company.

Mr. WASTELL, on behalf of his staff and himself, also thanked the Chairman and proprietors for their appreciation. There never was a time, he said, when the staff one and all vied more with each other to loyally and cheerfully do their utmost to carry out the very difficult duties which were imposed upon them under the present circumstances.

A PROPRIETOR suggested that, in addition to the resolution it was proposed to send to the men at the front, that some little gift, in the way of a personal comfort, should accompany it, so as to give added expression to the proprietors' appreciation.

The CHAIRMAN said that the suggestion would be taken into consideration by the Board, who would be very pleased to give effect to it, if found practicable.

Eastbourne and its Gas Supply.—Notwithstanding the recent rise of 2d. per 1000 cubic feet in the price of gas at Eastbourne, there is a big margin between the present figure of 2s. 8d. and the Company's standard rate of 4s. 4d. Of the 263 million cubic feet of gas disposed of last year, more than 252 millions were sold at 2s. 6d. and nearly 11 millions (in the out-districts) at 2s. 11d. The coin-meters in use in the Company's district are now more than those of the ordinary kind—5948 and 5417 respectively. The number of gas-stoves on hire is 9592; and there are 1543 public lamps supplied with gas. The total receipts for the six months to Dec. 31 were £48,797; and the expenditure, £42,080. With the balance brought forward, there is £13,188 at the credit of the profit and loss account, out of which the Directors will recommend, at the meeting of shareholders next Monday, a dividend at the rate of 7¾ per cent. per annum on the £65,000 of "A" stock, of 6¾ per cent. on the £198,000 of "B" stock, and the maximum dividend on the £3150 of 5 per cent. preference stock. These payments will require £8785, and leave £4403 to carry forward.

BRENTFORD GAS COMPANY.

The Half-Yearly Meeting of the Company was held last Friday, at St. Ermin's Hotel, Caxton Street, S.W.—Mr. R. J. NEVILLE NEVILLE, M.P., in the chair.

The SECRETARY (Mr John T. Croxford) read the notice convening the meeting; and the Directors' report and the accounts were taken as read.

The CHAIRMAN, in moving the adoption of the report and accounts, said that this was perhaps the most interesting meeting that the proprietors of the Company had ever had the opportunity of attending. The Company was now in its ninety-fourth year; and during all this period it had contrived to continue single. This, however, was the last occasion on which the old "bachelor" Company, if he might call it so, would be meeting, because as from Jan. 1 the Company had become united, in the "strictest bonds of matrimony and partnership," with two other Companies. Thus the old Company as they had known it—and which, he believed he might say, certainly in the memory of every, or nearly every, shareholder present, had never raised the price of gas, but had continuously reduced it—was now a thing of the past.

STARTING A NEW ERA.

They were now starting a new era; and owing to the amalgamations which had been carried into effect, the Brentford Gas Company had become the third largest Metropolitan Company, and he thought it was the eighth largest Company in the United Kingdom. He trusted this new era would be one of prosperity; and if there was any sort of augury which would show that the prosperity of the Company ought to be maintained, he thought it was to be found in the report and accounts which were now in the hands of the proprietors. When they came to consider what other gas companies had had to meet, and the many difficulties, financial and trading—and also the police regulations, which were very stringent in the Company's district, as over the whole of the Metropolis—and found that the Brentford Company were this year no less than £3500 better off in regard to profit than was the case twelve months ago, it seemed to him to speak volumes for the stability and power of the Company to stand against the shocks of most unexpected misfortune. Without going into the minutiæ of the various points, he would deal generally with the accounts. When they reflected that this particular period had been one of very great difficulty for the whole of the country, and that every institution which carried on business was bound to be affected by it, and when they remembered that their own Company had also been in Parliament and incurred an additional expenditure of something like £4500, they would agree with him that these accounts were almost astonishing ones for the Company to be able to present to their shareholders. When, also, they saw still further, with the price of coal rising as it had been doing, that the actual difference in the cost of coal to the Company in the last six months, as compared with the same half of the previous year, was only £143, they would all recognize that they owed a great debt of gratitude to their Engineer (Mr. A. A. Johnston) for the splendid foresight and ability he had displayed. He did not think there was another Company in England who could show an increase in consumption of 1·75 per cent., as they themselves had done, with an increase in the price of coals of only £143 above what it was this time last year. When they came to look into the accounts, they could understand the prosperous condition. It would be seen, for instance, that sales of gas, meter rental, &c., had increased by about £7000, and that the make of gas per ton of coal carbonized had gone up by some 330 cubic feet, compared with the corresponding period. These were the sort of things which enabled such excellent accounts to be presented. The provision for repairs and maintenance of works and plant had for years past been on a lavish scale. They had been preparing for the big increase in business which they knew they would get in the future, and in prosperous years had been doing what they could to provide against lean years. This item was less in the present accounts by £14,381—having gone down from £43,000 odd to some £29,000. The first-named sum was above the average; and, as he had said, it was for the purpose of preparing for the big business they were now in a position to undertake. Then on the other side they found, if he might say so, the one black spot of the half year—the price of residuals. Coke, tar, and ammoniacal liquor had been a great feature against this particular account; and there they lost £9700, as compared with the corresponding period. There were also other items of expenditure which went against these accounts. There had been an increase under purification of £1100; but the reason for this was that at Southall they had installed a new set of purifiers, and had had to equip them with the necessary oxide, which was charged for in this sum. Repairs and renewals of meters were more by £1200, and of stoves by £700; and rents, rates, and taxes were up another £1000. Then they had the parliamentary charges of £4800, and they had also had to pay £1500 for interest. It had been necessary to have a large overdraft from the bankers, for the capital account was overdrawn to the extent of £88,850. Of course, the time would come when they would have to raise fresh capital to put this account in a proper condition. On the other side of the capital account, it would be seen that there had been spent during the half year £31,171, due chiefly to the money they had had to lay out so as to be in a position to link up with the Staines and Egham and Sunbury undertakings. They had practically now paid the bulk of the money which it would be necessary for them to spend in taking over these works. The net result of the figures he had referred to was that they had made economies, and got increased money from the sale of gas, &c., amounting to £25,634. To set against this there were items amounting to over £23,000, leaving a balance in favour of 1914 of about £2000, as compared with the same half of 1913. The sum required for the dividend was £46,000, and the profit for the half year was £36,558, which meant that there was a deficit on the six months' working of £9442. But when they came to consider that in the June half year there was a surplus over the dividend of £5229, it would be seen that the deficit was reduced to £4212; and had it not been for the non-recurrent item of parliamentary expenses, there would actually have been a surplus on the year's working of £500.

THE QUESTION OF COAL AND FREIGHTS.

With regard to the future, no man was going to be fool enough to put his tongue to a prophecy; but at the moment if any of the proprietors had special knowledge as to when the war was going to end, the Board would be pleased to be informed. In the absence of this, prophecy was impossible. They were at the present time confronted with great difficulties in the matter of freight. At the Southall station, as the proprietors were aware, there was railway accommodation; and railway rates were fixed by Act of Parliament. There was no possibility, without going before the Railway Commission, of getting an increase; and there was a maximum beyond which the railway companies could not go. Therefore for every ton of coal that came by rail the cost of carriage could be foreseen; but when they had to deal with that which came by sea, they were entirely "at sea" in the matter of freights. Southall in this regard was better off than Brentford, which was practically dependent upon coal barged up the Thames, after reaching there by sea. The old rate, which they, with everybody else in London, had been accustomed to pay had been about 3s. per ton; but owing to a variety of factors—chiefly because the Government (and perfectly rightly so) had commandeered a large number of ships, and especially coal ships—there had arisen a shortage of tonnage, and quite recently freights had gone up to 13s. 6d. per ton. Even at the present time they were about 11s. per ton. This was a very serious matter indeed; and the gas companies had combined, and other users of coal had combined, to make representations to the Government in regard to securing some sort of facilities for the carriage of the coal which was so essential to the comfort and well-being, not only of the gas companies, but also of the consumers of gas, who, in the case of the Brentford Company, were very largely poor people. The bulk of their customers were those who consumed gas through the prepayment meter; and when it was remembered that they had 108,000 consumers out of a possible 120,000—that was, 90 per cent.—in the old Brentford area, it would be recognized that if there was going to be any rise in price such as was indicated by the rise in freights, it would be a very serious thing for the people in a very large section of their district. The Government had not quite met the gas companies in this matter. ["Hear, hear."] He had hoped on the previous night—and he spent over five hours trying to catch the Speaker's eye—to raise the question in Parliament on behalf of those who were affected by the extraordinary cost of freight. The Government had told them that they had assigned twenty interned German steamers for the benefit of the coal trade of London, and had fourteen others, which would be similarly employed. But the trouble to-day was the freight which was being charged; and those who were under a statutory obligation to supply gas thought there ought to be something done which would result in a reasonable charge considering all the risks. They should have some sort of a right to a reasonable price for the tonnage they wanted. As he had said, 3s. was the figure before the war; and they were of opinion that 5s. or 6s. ought to be a sufficient price to cover the additional risks which had arisen because of the war. The Government had not at present seen their way to do this; and he hoped those who were dependent upon a supply of coal for the necessities of life would bring pressure to bear upon the Government to make them see the line they had taken was not the one best calculated to serve the interests of a very large section of the community in the London district. They must do what they could to secure some new arrangement. At the present time, who was getting the profit on these interned ships they did not know; but it did not seem that there ought to be very much profit made, considering the circumstances. The Governor of the Gas Light and Coke Company had stated that 1s. per ton increase on coal meant 1d. per 1000 cubic feet. It would mean in the case of their own Company, if they had anything like an increase of 8s. per ton, a rise of 5d. or 6d. per 1000 cubic feet in the price of gas; and this would result in a very serious diminution in the facilities given by the Company to their poor consumers, and would be a great hindrance to the prosperity of the undertaking generally.

LOYALTY OF EMPLOYEES AND EMPLOYERS.

There was a very gratifying feature which he would like to mention, and this was that the Company had nearly 300 men who had joined the Colours. A Roll of Honour had been prepared, and would be hung in a prominent position in the offices, so that all might see what their employees were doing in the interests of the country. [This roll was exhibited on the wall during the meeting.] Now, 300 men was a very large proportion of their employees; and, of course, in addition to this there were a great many others who had also undertaken patriotic work. For instance, he believed there were in the Company about 100 special constables. Then, again, a rifle-range had been put up, which was well patronized; and almost all those who were capable were doing their best to fit themselves to serve their country should the need arise. He felt sure the Board would have the approval of the shareholders in making suitable provision in the case of those who were with the forces. They had done as all good employers did—undertaken to keep their places open for those who had gone to the front, and made proper allowances to their dependants. ["Hear, hear."] Then, of course, all these men having gone, the Company had had their offices and works depleted; and one of the most pleasant things about the matter—though, knowing their loyalty, it was only what one might have expected—was the way in which old members of the staff and men who had retired had come forward to help the Company shoulder the load during the sudden transition from normal times to warfare conditions.

THE LARGER DISTRICT.

As to the new Staines and Egham and Sunbury areas, a gratifying point was that there were considerable signs of a growth in consumption. Stoves and appliances of this sort were being put in. The Staines site would also be useful to them for maintaining a good supply of gas at the far end of their district. The Company had been lucky in one other thing, and this was that Mr. Johnston had postponed a projected visit to Germany, and so was not interned, as he otherwise probably

would have been. He had the authority of the Directors last summer to go over and inspect the various installations of gas plant in Berlin, Vienna, Hamburg, and other places.

Mr. R. SHAFTO ADAIR having formally seconded the resolution for the adoption of the report and accounts,

The CHAIRMAN, in reply to questions, said that with regard to repairs and maintenance nothing had been postponed; they were ahead with everything. It was thought that the normal amount which they would have to spend on wear and tear, &c., was about the figure shown in the present accounts. They recognized, of course, that freight must cost more than in ordinary times, because of delays, demurrage, and increased wages. The Directors had been, and still were, considering the advisability of providing themselves with a ship; but, of course, if it was commandeered there would not be much gain in that. At the present time the Company were not paying their full dividend; they had ¼ per cent. in hand. The dividend was precisely the same under the new scheme as in the old one, except that under the old arrangement they could not pay an increased dividend unless a reduction in price had been made over a whole year. Now they could pay an increased dividend in respect of a reduction over half a year. This was the only advantage they got.

Proposed by the CHAIRMAN, and seconded by Mr. ADAIR, a dividend was declared (subject to income-tax) at the rate of 5 per cent. per annum on the 5 per cent. preference stock, at the rate of 14 per cent. per annum on the consolidated stock, and at the rate of 11 per cent. per annum on the new (1881) stock.

On the proposition of the CHAIRMAN, seconded by Mr. ADAIR, the Directors were then authorized, in pursuance of the powers conferred by the Brentford Gas Act, 1914, to raise from time to time, as they think expedient, by public auction or tender, any sum or sums not exceeding in the whole £250,000 of further capital, by the issue of "B" consolidated stock. The Chairman remarked that it was thought they would require not less than £150,000 in the immediate future.

Next, the retiring Directors (Mr. R. Shafto Adair and Mr. William King) were re-appointed, as also were the Auditors (Mr. Monier F. Monier-Williams and Mr. Alfred Bevis).

An Extraordinary Meeting.

An Extraordinary General Meeting was then held for the purpose of authorizing the Directors to raise further capital by the issue of £250,000 in debenture stock or mortgage bonds, as authorized by the Company's Acts of Parliament, at such times and in such manner as they shall think fit.

The CHAIRMAN, in moving a resolution to this effect, pointed out that the present time was a very awkward one for raising money. Of course, they would have to satisfy the Board of Trade; but there would be no difficulty in this. In the circumstances, the Directors wished to have the freest possible hand as to the time and conditions under which the issue should be made. So far no steps had been taken; and they would consult qualified financial people as to the best way to proceed. They might be advised to issue terminable mortgage bonds, as a means of enabling them to raise money at a reasonable rate of interest.

Mr. ADAIR seconded the motion, which was duly passed, without any discussion.

THE GOVERNMENT AND A PUBLIC DUTY.

Mr. H. D. ELLIS proposed a hearty vote of thanks to the Chairman, Directors, staff, and employees. He remarked that the Chairman had referred to the Company as having entered into "matrimonial bonds." He was rather surprised to hear him use this adjective, because they had made an alliance with two parties. Therefore it seemed to him that the Company must have committed "bigamy." [Laughter.] He entirely agreed as to all the favourable points which had been indicated. It was an extraordinary thing that in such times as they had been passing through the Company should have been able to pay their parliamentary charges of £4860, and in addition stamp duty on conversion, which all reduced the amount available for dividend. Another point on which he would like to touch was as to what the Government were going to do to help the gas and other companies engaged in the illumination of London in the position in which they fonnd themselves. He hoped the Chairman would be able to bring the matter prominently before Parliament. It was not, it seemed to him, sufficient that Parliament should look upon them as ordinary traders bent purely on making money. They were engaged in the discharge of a public duty, on which the safety of the Metropolis depended. Therefore the Government should give to such undertakings some special consideration, so as to enable them to ensure that there should be no failure of light in London. He was pleased to see such a large Roll of Honour; but he noticed some writing attached to a few of the names. Did this denote casualties?

The CHAIRMAN: Yes; unfortunately it does.

Mr. ELLIS said, in that case, they ought to pass a special vote to those whose names were mentioned on the roll, and a vote of condolence with the relatives of those who were stated to have died upon the Field of Honour.

Mr. W. RICHARDS seconded the proposition, which was heartily carried.

The CHAIRMAN, in acknowledgment, remarked that the whole staff thoroughly deserved every praise the shareholders could give, because a better and a more loyal staff he believed did not exist. He did not expect that at the end of the next half year the Company would be in so good a position as to-day; but he hoped they would be able to show that they had not been behindhand in looking after the interests of the shareholders and the consumers.

Output of Gas at Carnarvon.—According to a recent report by the Gas Committee to the Carnarvon Town Council, the make of gas from March 25, 1914, to Jan. 25, 1915, amounted to 31,558,500 cubic feet, compared with the previous year's 30,199,300 cubic feet; being an increase of 1,359,200 cubic feet. It has been decided to put in some new retorts.

SHEFFIELD UNITED GAS COMPANY.

Annual Report and Accounts.

In the report which the Directors of the Sheffield United Gas Company will present at the ordinary general meeting on the 8th prox. they state that, bearing in mind the special circumstances of the past year—viz., declining trade and the outbreak of the war at the commencement of August—the increase of 92,060,000 cubic feet in the quantity of gas sold, or 2 per cent., must be regarded as satisfactory, more especially as there was an increase on the previous three years of 24·67 per cent., and it would not have been surprising had there been a falling-off, owing to the conditions referred to, in the quantity consumed. The profit is considerably below the amount required for the payment of the dividend; and it will be necessary to take £34,735 from the amount carried forward from previous years. The price of coal is still high, though a reduction was obtained on the new contracts; and the cost of labour has been considerably more, owing to advances in wages. The usual interim dividend of 5 per cent. was paid for the half year ended June 30 last. The average price at which gas was sold during the past twelve months was 1s. 1·32d. per 1000 cubic feet.

The accounts accompanying the report show that the revenue from the sale of gas was £257,549; rental of meters and stoves, £22,566; and residual products, £173,303—miscellaneous items bringing up the total to £456,236. The following are the principal items of expenditure: Manufacture of gas, £327,170; distribution, £35,878; management, £14,666; rents, rates, and taxes, £20,090—miscellaneous items (including £635 paid to the families of men who have joined the Army) making up a total of £403,376, leaving £52,860 to be carried to the profit and loss account.

ELECTRICITY CHARGES AT CARLISLE.

A Long Discussion.

A proposal by the Electricity Committee to make certain charges for bulk supplies of current, under agreement, on the terms and conditions of the "restricted hour" system, was debated at length at a meeting of the Carlisle City Council last Tuesday. The Committee's recommendation had already been before the Council, who had requested them to reconsider the matter. This they did; and last week reported that they had decided to adhere to the recommendation.

Mr. GIBBINGS (the Chairman of the Committee) said they desired to leave to the Council the responsibility of accepting or rejecting the proposals. The argument that had been used against them was simply that it was desirable to put a stop to the competition between the gas and electricity undertakings. It had been suggested that the two concerns should be combined. There was something to be said for this; but in the interests of the consumers he did not think it would be a good thing. In the case of electricity it was impossible to make an equal charge to all consumers. The reasons for this were: Firstly, the impracticability of storing on a large scale such as obtained in gas undertakings; and, secondly, that any material reduction in the price of electricity could be only brought about by an improved load-factor. A man paying ¾d. per unit under the restricted hour conditions was often a better customer than another who paid 4¾d. without restriction.

Mr. BUCK (the Chairman of the Gas Committee), in opposing the recommendation, pointed out that the firm for whom this special rate was demanded, desired, and very naturally so, to get their power at a lower cost than they had hitherto been doing. They had been, and still were, he understood, using gas for their engines. Finding that the Gas Committee could not reduce the price as fixed by the Council, they decided to use electricity; and this ended the interest of the Gas Committee. But when it was shown that a special rate was to be created on what Mr. Gibbings was pleased to call the restricted hour system, and this reduction was to be of a sweeping character, the Gas Committee, in order to protect their other customers, informed the Electricity Committee that they would oppose it in Council. A Joint Committee meeting was held; and, as no satisfactory solution could be arrived at, the Electricity Committee decided to lay the matter before the Council. This was done at their last meeting; and the Council decided that the matter should be referred back. Now, having appealed to Cæsar, they said they would not abide by his decision, and brought it back to the Council with the same old cry that it was not a reduction in price, but merely an addition to the tariff. He was ready to admit that this particular case was not at all vital to the Electricity Department as a whole; but the principle underlying the action was vital to the interests of the Corporation. It practically meant that, in order to obtain business for electric current, they were quite prepared to accept any price they could get. The conditions of this particular client for a restricted hour supply were such that he had no more right to a reduction in price than any other of the large consumers; and if the Council confirmed the recommendation, they would be doing injustice to a very large number of their best customers. Users of electricity all the year round were as much, if not more, entitled to the lowest possible rate that could be charged. It often seemed strange to him that certain members of the Council were so opposed to any reduction in the price of gas, which was the poor man's light, and was rapidly becoming his fire as well, but yet were eager to welcome any reduction in the price of electric current in spite of adverse balance-sheets, when the current was supplied to users who could pay well, and to rich men who installed it in their houses. If they decided to delete this resolution, were they in any way putting a block on any industry? He thought not. He believed the object of the demand of the Electricity Committee was to enable a firm to manufacture ice. To a certain extent, ice was a luxury, though it was often required medicinally; and to create such a revolution in prices as to reduce the kilowatt from £4 15s. to 15s., in order that a maker of ice could obtain cheaper power, was to him a most unbusinesslike suggestion, and one he felt sure the Council would never agree to.

Mr. HUTCHINSON said he remembered the Chairman of the Gas

Committee himself arguing, with regard to cookers, that by cheapening the rate to the consumer they were offering facilities to people to use more gas; and by using more gas they would bring into operation plant which was idle in the summer time. This was exactly what the Electricity Committee said. It was not a case of competition in this particular instance; neither to his mind was it a new scale of charges. The old scale of charges, he took it, remained; and this was a new price to a new customer under different conditions. Therefore he failed to see how it could be made out to be an alteration in price.

Mr. BRIGGS asked why the Council should be asked to agree to a special reduction of price for electricity to manufacturers, when they would not agree to a special price for gas.

Mr. CAMPBELL suggested that these "recurring debates" might be obviated if the Electricity Committee would use gas instead of coal for power purposes.

After a number of other speeches had been made and Mr. Gibbings had replied, the matter was put to the vote, and the recommendation of the Electricity Committee was rejected.

THE PROPOSED NATIONAL DYE INDUSTRY.

The New Scheme.

In the "JOURNAL" for the 2nd inst. (p. 268), we gave the fresh proposals formulated by the reconstituted Committee of users of dyes appointed to confer with representatives of the Board of Trade regarding a scheme for placing the British dyeware industry on a national footing. The Committee issued last Thursday a new scheme, of which the following is an outline.

The new scheme is on a smaller scale than was projected at first. The Committee will take over and extend the plant of existing firms in this country; they do not now propose to erect new works. On the other hand, it is intended to make arrangements with Swiss firms to obtain a supply of finished dyes in return for half-manufactured material formerly imported into Switzerland from Germany. The Committee have entered into negotiations with the Society of Chemical Industry of Basel and the Clayton Aniline Company (which is owned by the Society) with a view to the purchase of the latter undertaking and to obtaining from Switzerland a considerable quantity of dyes.

Priority in supply will be given to users of dyes who subscribe for the shares of the new company; but it is stated that it has not been found possible to eliminate altogether the unpopular contract clause under which buyers bind themselves to take the new company's products if these are "of good quality, suitable for the purposes of the buyer's business, and at reasonable prices."

It is admitted that the company will not for some time be in a position to supply all the dye requirements of the country; and as those dyes which it can manufacture will be primarily appropriated for supplying the wants of users who are shareholders, users who are not shareholders will probably suffer considerable inconvenience.

The management of the new company will be vested in a board of directors, subject to the conditions on which Government assistance is to be given—viz., (1) That the company shall remain British; (2) that the Government have the right to nominate two directors, with power to prevent undue preference or encroachment on the businesses of British manufacturers of products other than dyes and colours.

On the financial side it can be urged that the share capital is protected by the absence of the power of foreclosure for 25 years, and in this way the loan and share capital of the company cannot be depleted for interest payments. No underwriting cost will be incurred. These points are important, though probably the vast majority of those who subscribe will do so, not in the hope of making a good investment in the ordinary sense, but as an insurance against the danger of further dependence upon German dyes.

REDUCED PUBLIC LIGHTING IN WESTMINSTER.

Allowance Granted by the Gas Light and Coke Company, but Refused by the Electric Light Companies.

At the last Meeting of the Westminster City Council, the Works Committee reported that the Westminster Electric Supply Corporation, the Charing Cross, West End, and City Electricity Supply Company, and the Gas Light and Coke Company (the three Companies furnishing the public lighting in Westminster), had been asked what allowance they would make to the Council in respect of the reduction of public lighting to the 31st of December last which had been required pursuant to the Defence of the Realm Act.

The Electric Light Companies had expressed their inability to make any concession. The former stated that against any small saving effected, which would not amount to more than £100 by the 31st of December last, the Company were paying a much higher rate for carbons. For the same number of days, the extra cost on this account amounted to £666; so that for the period they were £566 worse off as regarded their street lighting contract. The Charing Cross Company declined on the ground that the Order in Council had had the effect of seriously curtailing the lighting supplied by the Company, and that the making of any reduction would probably involve similar concessions to persons supplied by them under similar contracts. The Gas Light and Coke Company, on the other hand, were prepared, without prejudice to their legal position, to make an allowance of £700, which represented all the saving they could, on a liberal estimation, be regarded as having made as a consequence of the gas not having been consumed.

The Committee observed that, as regarded the Electric Light Companies, it appeared that very little less than the normal amount of current was being consumed; and any saving that they might make was probably accounted for in the cost of works necessary to effect the reduction of light. The Committee were of opinion that the Companies should not be pressed to grant any allowance, so long as they did not make any claim beyond the contract amounts for the extra work performed by them in reducing the lighting. The Committee thought the offer of the Gas Light and Coke Company very fair; and they recommended its acceptance.

Mr. G. H. HEILBUTH thought the offer of the Gas Company should be accepted with the Council's best thanks, because the Company had met the Council and the ratepayers of Westminster in a very fair and patriotic spirit. [Hear, hear.] He trusted, however, that the Council would not accept the Committee's report in connection with the Electric Companies, as next year was likely to be a "punishing" one for the rates. He moved the reference back of the recommendation, in order to afford the Works Committee an opportunity for further negotiation with the Electric Companies. He suggested that, in the meantime, the Council should only pay (say) one-half or two-thirds of the Companies' accounts, and ascertain what other electric companies in London were proposing to do in this connection. While he did not dispute what the Companies had said, he felt sure, if they went fully into the subject, they would find they could allow some reduction.

Mr. F. G. RYE seconded the motion.

Mr. J. C. DALTON, a member of the Street Lighting Committee, said they proposed to pay the amount without prejudice to the Council, who were under a contract behind which they could not go. The position of the Gas Light and Coke Company and the Electric Companies was entirely different. The Gas Company wished the Council would not burn so much gas, because coal was so expensive, and when their lights were out no coal was consumed, so that this was a complete saving to the Company.

Mr. E. HOWLEY SIM, the Chairman of the Works Committee, emphasized the point that the payments were without prejudice, and that the Council could raise objection at any time. They always kept an amount in hand in connection with these contracts, and were thus in a strong position to deal with any contingency that might arise. The Committee would keep the matter under careful consideration, and it would be reported upon again in due course.

Mr. HEILBUTH'S motion was lost by a large majority, and the recommendations of the Committee were adopted.

COAL SUPPLIES FOR SMALL GAS-WORKS.

Many of the small gas-works in the West of England are being placed in an extremely awkward position by the difficulty of obtaining coal supplies. Whether they are dependent on seaborne or railway supplies, the trouble seems to be equally great. Several gas-works are carrying on business in circumstances of considerable anxiety, and there is no immediate prospect of effectual relief. In some instances the instructions issued by the Military Authorities for the restriction of public and private lighting have been hailed as a blessing, because of the relief which has been given to the demands upon the rapidly depleting stocks in the holders.

At Saltash, the Gas Company themselves initiated a proposal for the reduction of the lighting by the extinguishing of the public lamps at 9 or 10 p.m.; and the Town Council agreed that they shall be put out at 10 o'clock. It was explained that the Company had been since November vainly expecting the arrival of a cargo of coal; and, though it might come any day, they thought it better to economize on the public lights, rather than run the risk of leaving the houses in darkness. Members of the Corporation evidently appreciated the difficulties of the position, and had expressed the hope that private consumers would assist the Company by being economical in the use of gas until the full supply is again assured.

Then there is Kingsbridge, another small town near the sea, which has similar trouble. There, it seems, the supply of gas has been so restricted that the consumers have complained, and the Town Association have been moved to consider the question of the erection of electric light works. The matter was mentioned at a meeting of the Urban District Council last week, with the result that the Chairman (Mr. J. S. Hurrell), who knew the facts, was able to explain publicly the awkward position of the Gas Company. The Company, he said, had ordered coal of the best quality for gas making; but owing to the war, they were unable to get it delivered, and at the beginning of the month would have had to close the works, but for the kindness of a local firm who let them have a supply of coal. At that time they had not a pennyworth of coal in store; and they had to make the best use of such as was supplied to them in the circumstances. They still had difficulties in procuring coal. People had no consideration for the Gas Company, and blamed them when the real fault often lay with dirty and improper fittings. The Directors of the Company, he added, received no pay and no thanks; and the undertaking was carried on at a loss.

Another town which has experienced some trouble is South Molton, though the tale of woe there is not so dismal as at Kingsbridge. The South Molton Gas Committee could not get coal delivered according to contract, and had to pay 5s. or 6s. per ton more than the contract price, in order to obtain supplies. The Mayor and the Gas Manager decided that it was desirable to reduce the consumption of gas, and had most of the public lamps extinguished. It was suggested, at a meeting of the Town Council last week, that private consumers should be asked to be as economical as possible in the use of gas; but the Gas Committee apparently did not think it necessary to issue any such request, and the Mayor expressed the opinion that no serious trouble would recur in regard to supplies of coal. It will be a relief to the managers of many small works remote from the coalfields when they are able to feel equal confidence.

"Household Necessities" is the title of the latest catalogue issued by Mr. William Edgar, of the Blenheim Works, Hammersmith, W. It furnishes particulars of the "Instanter" and "Waterloo" geysers, the "Blenheim" circulator and gas-fire, greenhouse and garage heaters, and other appliances,

ADDITIONAL POWERS FOR THE METROPOLITAN WATER BOARD.

London County Council and the Board's Finances.

At a recent meeting of the London County Council, the Parliamentary Committee, in submitting a report in regard to the Bill of the Metropolitan Water Board of the present session, merely indicated that it sought to empower the Board to make water-works and other works in the Metropolitan Boroughs of Camberwell, Lambeth, Lewisham, and Woolwich, and to construct a subway or tunnel in the first-named borough. The Bill also contained additional powers for the Board to raise money, and miscellaneous provisions as to water supply. The Committee recommended that a petition be presented against the Bill.

Mr. J. D. GILBERT complained of the very meagre information contained in the report on a Bill of such importance to the ratepayers of London as the one under consideration. The administration of the Board, so far as London was concerned, had, he said, been most unfortunate, as the following figures of the deficiency in the working would show: In 1908-9 it was £25,279; in 1909-10, £46,076; in 1910-11, £64,480; in 1911-12, £73,737; in 1912-13, £63,647; and in 1913-14, £15,385; while the estimated deficiency for 1914-15 was £94,700. The Council were entitled to know from the Parliamentary Committee whether the new powers sought by the Board were likely to have the result of increasing the deficiency. The water consumers and ratepayers of London had to pay something like 80 per cent. of the Board's deficiency. Something ought to be done by the Council to remedy the present inequality in assessment for water purposes between London and the outside areas supplied by the Board. Indeed, he went so far as to ask the Committee to appeal to the Board so to manage their accounts that there should be no deficiency in the future, and thus the London ratepayer, who already paid full value for the water supplied, would not also have to contribute to the deficiency.

Sir JOHN BENN said, while he was quite sure the Parliamentary Committee had every disposition to help the Council and London in connection with this important matter, he was afraid that a petition on the merits of the scheme for which the Board sought powers would be ruled-out on the ground that the works comprised in it were necessary. If the basis of the petition were the points raised by Mr. Gilbert—that a grave injustice existed at the present time in the inequality of the apportionment which gave the suburban consumer an advantage of anything from 25 to 36 per cent., and that this injustice should be remedied before any further expenditure was sanctioned—he thought the Council would have very good *locus*.

Mr. W. C. JOHNSON explained that the action of the Parliamentary Committee is not meeting until a week after their proper date, and then referring the subject to the Local Government Committee, had not allowed the latter to consider it properly.

Mr. LAURENCE W. S. ROSTRON (Chairman of the Local Government Committee) replied that the Parliamentary Committee could not arrive at any decision straight away, not having the full facts before them; and consequently they referred the matter to his Committee, where it was discussed at length.

Mr. PERCY GATES, replying for the Parliamentary Committee, said the points raised by Mr. Gilbert had been brought to their notice and carefully considered by them. Effect would, as far as possible, be given to them in the petition which the Council would present. An invitation had been extended to the Council's representatives on the Water Board to attend a meeting of the Parliamentary Committee at which the matter was to be thoroughly discussed; and he trusted the Committee would then have a memorandum on the subject from the Local Government Committee.

The Council unanimously resolved to petition against the Bill.

The *agenda* for the meeting of the Council to-day contains a long report by the Local Government, Records, and Museums Committee on the subject of the Water Board's deficiency rate. The Committee gave details of the amount of the deficiency in the water fund each year since 1908 and of the rate raised to meet it, dealt with the inequalities and anomalies of the rate, and set forth their proposals for the reform of the existing system. The Committee recommended that the Board should promote a Bill next session to "provide for the establishment of a more equitable system of dealing with deficiencies in the water fund;" also that the resolution come to by them should be communicated to the Board and to the representatives thereon of the Council, the Corporation of London, and the Metropolitan Boroughs.

In a second report, prepared subsequently to the one above referred to, the Committee said they deemed it desirable to invite the thirteen representatives of the Council on the Board to confer with them in order that they might have the advantage of hearing their views. The invitation was accepted by Sir Melvill Beachcroft, Dr. R. M. Beaton, the Rev. Stewart Headlam, and Mr. David S. Waterlow, with whom the Committee discussed the questions raised in their various aspects. They undertook that, if the Council agreed to the Committee's proposal, they would support it at the Board. But they stated that the difficulty of securing united action on such a matter between the representatives of the various London constituent authorities must not be underrated; and they suggested that a conference should be held between the Council and the Board. Subject to the Board approving the principle of the proposed legislation, the Committee think such a conference would be useful; and they are in communication with the General Purposes Committee on the matter.

The Parliamentary Committee also referred to the subject in their report dealing with the Board's Bill now before Parliament; and they concluded with a recommendation that they should be authorized to take steps, if necessary, to place before the House of Commons, at the

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second reading stage of the Bill, "the necessity for the establisment of a more equitable system of dealing with deficiencies in the water fund."

Borough Councils' Opposition to the Bill.

Among the local authorities in London, clauses 48 and 49 of the Bill—which would enable the Board to cut off the water from any premises on receiving notice of discontinuance of the supply or the removal of the consumer, or upon the premises becoming vacant without such notice, and to charge to the consumer the cost of both cutting off and reconnecting the supply—are the subject of strong opposition.

The Woolwich Borough Council, who took the lead in the matter, are of opinion that the provisions above referred to will press very hardly upon small consumers, and also upon owners of small properties which are constantly becoming empty; and they have asked their Member of Parliament to oppose the Bill on second reading unless these objectionable clauses are omitted. The Council have requested all the Borough Councils in London to take similar action.

The Stepney Borough Council, at their last meeting, agreed with the Woolwich Council, particularly in regard to clause 49, and instructed the Town Clerk to communicate with the Water Board, intimating that the Council concurred in the opinion expressed by the Woolwich Borough Council, and requesting the Board to reconsider the matter with a view to deleting the clauses from the Bill.

The Law and Parliamentary Committee of the Westminster City Council, in a recent report, stated that they had no objection to clause 49, but agreed that clause 48 would press hardly upon owners and occupiers of small properties; and they suggested that the Council should address a communication to the Water Board expressing this opinion, and suggesting the withdrawal of clause 48. At a recent meeting of the Council at which the subject was discussed, Mr. S. Gluckstein (the Chairman of the Law and Parliamentary Committee) explained that a memorandum which the Water Board had issued stated that clause 48 was inserted to meet the case where a consumer, supplied under the Board's Charges Act, 1907, or otherwise, vacated the premises between any two quarters, as mentioned in section 71 of the Water-Works Clauses Act, 1847. The latter section did not empower the Board to disconnect the supply upon the termination of the tenancy in the circumstances referred to, and at present the Board had no statutory provision in regard to what was to happen when the consumer ceased to be supplied. His own opinion was that the clause was too wide as it stood. The Board, in effect, had said they did not want this power in the case of water supplied for domestic purposes; and if they limited it to the question of supply by meter, this would probably meet the case. Mr. G. W. Lawrence (one of the Council's representatives on the Water Board) said the Board were not desirous of pressing hardly on anybody; and he thought communications between members representing the different districts and the Board would be the means of obviating any legislative opposition. Mr. H. C. Russell expressed the opinion that any legislation should be in favour of the ratepayers; and he hoped the various public bodies of London would not give in to the Board on this question. The subject is at present being further considered by the Committee.

The Wandsworth Borough Council are petitioning against the clauses relating to the construction of tram roads, &c., and the cutting off of the supply for non-payment of water-rates, &c. Endeavours are also to be made to obtain the insertion of a clause making the Water Board responsible for damage caused by the bursting of mains.

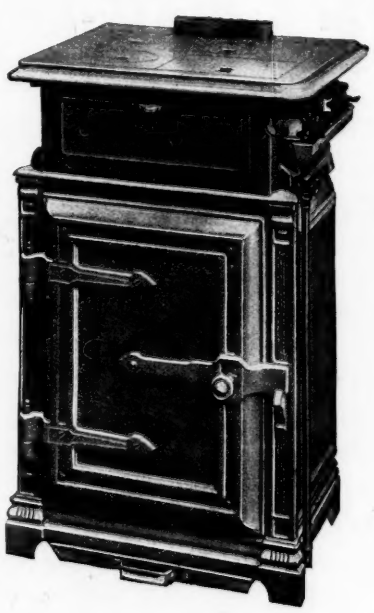
NOTES FROM SCOTLAND.

From Our Own Correspondents.

Saturday.

The proposal that the Government should put into operation section 4 of the Coal Mines Regulation Act in order to secure an increased coal output was discussed by the Glasgow Corporation at a meeting held on Thursday—Lord Provost Dunlop presiding. Bailie Irwin reported on a conference of the Corporations of Glasgow, Dundee, and Aberdeen and of the Edinburgh and Leith Gas Commissioners, at which a resolution has been adopted to the effect that, in view of the present restricted supply of coal to gas-works, due to the diminished output, the want of adequate transit facilities, and other causes connected with the war, and of the probable further curtailment of such supplies, the Government should be approached to put into operation section 4 of the Coal Mines Regulation Act, 1908, which gives power to suspend the operation of the Act, and thus permit the miners to work longer than eight hours per day. The Corporation Committee on Gas Supply recommended the Council to adopt the resolution. Bailie Irwin spoke of difficulties which had been experienced in getting delivery of coal. One of the largest establishments was reduced to a three days' supply, with no other coal immediately in sight. This, he said, was a risk the Gas Committee could not take without exhausting every legitimate opportunity of increasing the supply. Mr. Turner moved, as an amendment, that the Council should petition the Government not to put into operation section 4 before consulting with the duly accredited representatives of the coalowners and the Miners Federation; and Bailie Irwin said he was prepared to accept it. Various proposals were then brought forward; and eventually the Town Clerk stated that the movers had agreed that the following words should be incorporated in the resolution: "If, after consultation with the accredited representatives of the Mineowners' Association and the Miners' Federation and others interested, they consider it desirable to do so." With this addition, the motion was accepted by the Council.

At a meeting held last Tuesday, the Gas Committee of the Dundee Corporation had another discussion on the question of the shortage of the supply of coal. It will be remembered that at a previous meeting it had been decided to send a deputation, along with representatives



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from other corporations, to the Government to urge the necessity of a sufficient supply of coal being available for the manufacture of gas. Objection was taken at the last meeting of the Town Council to a suggestion in the Committee's finding that the eight-hour day in the coal mines should be suspended, and, as recorded in last week's "Notes," the matter was remitted back for further consideration. The Convener (Mr. Noble) explained the circumstances that had led to the matter being remitted back to the Committee, and said that there was a conference at Manchester, at which representatives from 41 corporations were present, when it was decided to urge upon the Prime Minister to take immediate steps to increase the present output of coal and to improve railway transport. The Aberdeen Town Council had authorized their Gas Committee to take such action as might be deemed necessary for the attainment of the object in view. This was no child's play. The Dundee Gas Department was already three months in arrear with their deliveries of coal, and the price was rapidly going up. The Town Clerk had communicated with the Committee's contractors on the subject, and were doing all they could to conserve the public interest. He would just move the same motion that was carried at Manchester [see *ante*, p. 308], because the more unanimous they were, the more chance there was of them being heard. Mr. Fletcher asked if this meant the suspension of the eight-hour day. The Convener replied in the negative. It merely asked the Government to consider the matter seriously. After some discussion, the motion was carried; and the Convener said they would try to get a special meeting of the Council in order to have the matter put through.

The Edinburgh and Leith Gas Commissioners are receiving tenders for 1000 tons of oil for gas-making purposes, delivery to be at the rate of 100 tons weekly. The Scottish Shale Oil Companies have stocks of this oil. The price of gas oils fluctuated last year, beginning at £4 15s., dropping in July to £4 5s., and rising in September to £5 5s. Latterly it has been about £4. Ample supplies have arrived by tank steamer from oversea oil ports.

The members of the Alloa Town Council discussed, at their monthly meeting on Monday, a proposal submitted by Mr. Alexander Wilson: "That a Sub-Committee of the Gas and Electricity Committee, to consist of not more than five (three to five), be appointed to consider all matters of importance dealing with the Gas and Electricity Departments before being submitted to the Town Council sitting as a Gas and Electricity Committee." In Mr. Wilson's opinion, a smaller Committee could deal with matters of detail better than one consisting of the whole of the Council. His motion would, he said, not only relieve the Convener of much responsibility, but would also assist the Gas Manager (Mr. J. W. Napier). Mr. Pearson, the Convener of the Committee, feared that if the motion were adopted, and a Sub-Committee appointed, the Council would feel that they had not the same freedom for criticism as at present. He was quite willing to go down to the gas-works with Mr. Wilson or any other member of the Council and explain any matter on which they desired more information; but he confessed that he was hardly in favour of the motion. After some discussion, a member moved the previous question. Mr. Wilson, replying to the remarks on his motion, said he did not want it to go from the meeting that his proposal was intended to interfere with the work of the Gas Manager. His object was to have a smaller Committee; his belief being that they would compel themselves to be more conversant with the work of the department than a large one would. On a vote, the previous question was carried by seven votes to five.

At a recent special meeting, the Motherwell Town Council accepted the offer of Messrs. R. & G. Hislop, of Paisley, for the erection of the new carbonizing plant for the gas-works. The complete plant consists of a bench of vertical retorts capable of producing 1¼ million cubic feet of gas per day on the Wilson system, with coal and coke handling plant, coke-storage bunkers, and a telpher transporting plant. These works have been decided upon in accordance with a report by Mr. Alexander Mackay, the Corporation Gas Engineer and Manager. The Town Council are to be congratulated on having thus brought the extension of the gas-works a step nearer realization, as it will effect very substantial economy in the manufacture of gas.

Important extensions are contemplated for the gas-works at Largs, on the Firth of Clyde. The desire is to erect plant to make sulphate of ammonia, to be shipped from Glasgow. Plant will also be installed to purify the tar. There is difficulty in selecting a suitable site; and the Gas Committee of the Town Council will report on the subject.

An extraordinary meeting of the shareholders of the Cambuslang Gas Company, Limited, was held last Monday night—Mr. Robert Black, of Ivy Bank, the Chairman of the Company, presiding. The meeting was called for the purpose of authorizing the borrowing of £15,000 for the erection of a gasholder. The Chairman stated that the Company were faced with the necessity of providing a further supply of gas for the district; otherwise the town might be in a serious difficulty next winter. In 1905 the gas supply was 50 million cubic feet; and at the present time it had advanced to 104 millions. It was thought by the Directors when the last gasholder was erected twelve years ago that it would meet the demand for the next twenty years. The Company had already purchased a piece of ground, but it would be necessary to acquire another portion. The Treasury had vetoed the expenditure of large sums of money by public bodies; and the Company would require to obtain permission before they could proceed with the work. It was unanimously agreed to borrow £15,000 for the proposed extension.

An interesting function took place last Saturday week, at No. 237, Cathedral Street, Glasgow, the home of Mr. Robert Shepherd, who was for many years Head Foreman in the Corporation Gas Distribution Department, Wall Street, Glasgow. Mr. Shepherd entertained the foremen of the department at an "At Home," on the occasion of his retiring from active service. About forty foremen were present, along with Mr. James M'Ghee, the Workshops Superintendent. The "Old Man," who is in his eightieth year, was at his post every morning at 5 a.m.; and on the date of his retirement (Jan. 30) he "blew the whistle" for the last time. Mr. Shepherd is in the best of health,

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and still active, and with care (a friend of his writes) should reach his centenary at least.

Petitions have been lodged with the Secretary for Scotland against Provisional Orders to come before Parliament this session. The Corporation of Cowdenbeath, the County Council of Fife (for themselves and the Dunfermline and Kirkcaldy District Committees), and the Corporations of Dunfermline and Inverkeithing have petitioned against the Cowdenbeath and District Gas Order; the Earl of Lanark and the Town Council of Airdrie, against the Glasgow Corporation Water Order; and the Clyde Trustees and the Corporation of Greenock, against the Port Glasgow Gas and Burgh Extension Order. Other petitions are against the Clackmannan County (Alloa and Tillicoultry) Water Order, the Glasgow Corporation (Gas, &c.) Order, the Irvine and District Water Board Orders, and the Lanarkshire County Council (Water, &c.) Order.

A meeting of the Water Committee of the Aberdeen Town Council was held on Tuesday for the purpose of considering the reports of Dr. Matthew Hay, Mr. C. H. Roberts (the Corporation Water Engineer), and Dr. A. C. Houston (the Director of Water Examination of the Metropolitan Water Board) on the River Dee as a source of water supply, with special reference to the proposed liming and other works which are dealt with in the reports. Dr. Hay gave full explanations on the subject, and expressed approval of the works which had been carried out or were projected. He pointed out that with filtration, sedimentation, and liming the purity of the supply would be assured. The Water Engineer also took part in the discussion. He made special reference to the large quantity of water which percolated through the aqueduct in wet weather, and emphasized the necessity for the new aqueduct being constructed with as little delay as possible. Some members expressed the opinion that in the present crisis the large expenditure involved might be deferred for some time. Mr. Stewart contended, however, that other corporations were promoting Bills, and that there was no reason why Aberdeen should postpone its scheme. It was also pointed out that the scheme would provide a large amount of employment for various classes of tradesmen after the war. It was resolved *nem. dis.* to adopt the scheme, and take the necessary steps for promoting a Bill to obtain sanction for carrying it out. The estimated cost of the first instalment, to furnish 8½ million gallons per day, including land, easements, &c., is £425,000, which includes the expenditure already incurred for the provisional purification works at Invercannie (£25,700). The second instalment, for a further 1½ million gallons per day, would cost £25,400.

Quality of Gas at Drogheda.—Replying to a complaint as to the quality of the gas supplied in Drogheda, Mr. H. W. Saville (the Gas Manager), in a letter to the Corporation, admitted that on two or three occasions of late the gas did get poor by reason of the neglect of the stokers to turn up to work and leaving without notice. This necessitated the putting-on of men who were unused to the work. He pointed out, however, that the quality had now improved.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Feb.* 15.

The prices for tar products remain practically unchanged. Solvent naphtha is very scarce and in good demand at 1s. 6d. per gallon, casks free. Sixties crude carbolic acid is somewhat easier, but the price remains at about 3s. per gallon, casks free. A certain amount of pitch continues to be shipped, but the extremely high rates of freight practically prohibit any new business.

Sulphate of ammonia remains about the same; and the price can be called £13 5s. per ton for 25 per cent. quality for prompt delivery.

Tar Products in the Provinces.

Feb. 15.

The markets for tar products have remained fairly steady throughout the past week. A fair amount of business has been done in benzol, and slightly improved prices have been paid in some quarters. Solvent naphtha is firm, and in one or two instances very good prices have been paid. Heavy naphtha is steady. Creosote is weaker, and sales have been made at lower figures. Crude carbolic remains steady.

The average values during the week were: Value of liquid products in one ton of tar, 17s. to 18s. 6d. Benzol, 90 per cent., naked, North, 9½d. to 10d.; 50-90 per cent., naked, North, 1s. 3d. to 1s. 4d. Toluol, naked, North, 2s. 3d. to 2s. 4d. Crude naphtha, in bulk, North, 5½d. to 5¾d. Solvent naphtha, naked, North, 1s. 1d. to 1s. 2d. Heavy naphtha, naked, North, 11d. to 1s. Creosote, in bulk, North, 3¼d. to 3⅜d. Heavy oils, in bulk, 4d. to 4⅛d. Carbolic acid, casks included, 60 per cent., East and West coasts, 2s. 10d. to 3s. Naphthalene, £6 to £11; salts, 65s., bags included. Anthracene, "A" quality, 2d. per unit; "B," nominally ¾d.

Sulphate of Ammonia in the Provinces.

LIVERPOOL, *Feb.* 13.

During the past week there has been no improvement in the congested state of the shipping centres, and this fact has now made some impression on the tone of the market for near delivery at those ports where the difficulties are greatest. The closing quotations are £13 12s. 6d. to £13 13s. 9d. per ton f.o.b. Hull, £13 15s. to £13 16s. 3d. per ton f.o.b. Liverpool, and £13 18s. 9d. to £14 per ton f.o.b. Leith. The check in the near position has had the effect of deterring buyers from operating far ahead, and no business has been reported beyond March, for which month prompt price has been paid.

Nitrate of Soda.

The market for this article has advanced further, and the values on spot are now 11s. per cwt. for ordinary, and 11s. 6d. for refined quality

"The Ideal Gas Fire."

Feb. 8th, 1915.

"The Renaissance Gasfire in my office is working quite satisfactorily, and I am inclined to give it the title of 'The Ideal Gasfire.'"

Feb. 6th, 1915.

"The Renaissance Gasfire here is a great joy, and its efficiency, both on heating and health grounds, is maintained. Moreover, it is quite 'silent.'"

Extracts from the letters of Two Leading London Medical Authorities.

The "Renaissance."

THE Richmond GAS STOVE & METER Co LTD

Inventors and Manufacturers of the Silent Gasfire.

Sulphate of Ammonia.

From another source it is reported that although the market for this article has remained fairly steady throughout the past week, yet some of the tender parcels have been sold at lower prices. Outside London, makes are quoted at £13 ; Hull, £13 15s. ; Leith, £14 ; Liverpool, £14 ; Middlesbrough, £13 17s. 6d.

COAL TRADE REPORT.

Northern Coal Trade.

The coal trade is firmer, with a better demand both for prompt and forward supplies. In the steam coal trade, the collieries appear to have sold most of their output for the rest of this month, and the prices are higher. Best Northumbrians are now quoted up to 15s. per ton f.o.b., with occasionally a higher price named for next month. Second-class steams are steady at about 13s. per ton for early delivery ; and steam smalls are stronger at 8s. 6d. to 10s. per ton f.o.b., so that the advance for the last-named coal is fully up to that for best steams. Production at the collieries is fair, when the large number of miners who have enlisted is kept in mind. In the gas coal trade, prices are firmer for prompt delivery. Best Durhams are about 12s. 8d. to 13s. per ton f.o.b. ; second-class gas coals are 11s. 3d. to 11s. 9d. per ton ; and "Wear Specials" are about 13s. 6d. per ton f.o.b. As to contracts, that for Bergen is believed to be concluded for some 20,000 tons of best Durhams for spring and summer delivery at about 12s. 9d. per ton. The Naples Gas-Works are in the market for their supply ; and the large contract for Stockholm for some 150,000 tons is also in negotiation. There are other sales in course of treaty ; this being the time when deliveries over the season are usually arranged for. Shipping appears to be in greater supply ; but freights do not show much further fall, though more of the captured steamers appear to be running. Coke is steady. Gas coke seems less abundant, and good makes vary from 11s. 9d. to 12s. 9d. per ton f.o.b. in the Tyne, according to the quality.

Chichester Gas Company.—The accounts of the Company for the past half year, which will be submitted to the shareholders at the meeting next Tuesday, state that the balance standing to the credit of the profit and loss account, net revenue (after providing for interest on the debenture stock, temporary loans, &c.), amounts to £2041, out of which the Directors recommend the declaration of a dividend for the half year ended Dec. 31 at the rate of 7 per cent. per annum upon the "A" capital stock, and £4 18s. per cent. per annum upon the "B" and "C" capital stocks, all less income-tax. The effect of the war has been to inflate the cost of coal and other materials and curtail the prices of residuals ; and these together have unfortunately adversely affected the balance of profit on the half year.

Truro Electric Lighting Order.—In reply to a request from the Truro Corporation for an extension of the city Electric Lighting Order, the Board of Trade have written that they have no power to extend it beyond the prescribed time for the completion of the work. If on or about Aug. 15 next the Corporation informed the Board what steps had been taken to give effect to the Order, the Board would be prepared favourably to consider an application for the postponement of the revoking Order for a period of twelve months.

West Cheshire Water Company.—The accounts for the year ended Dec. 31, to be presented at the meeting of the Company next Friday, show that the balance at the credit of the profit and loss account was £8529, which, with £12,221 brought forward from the previous year, makes a total of £20,750. Out of this amount the interim dividends at the rate of 5 per cent. per annum paid in September last absorbed £3000, leaving a balance of £17,750 available ; and the Directors recommend the payment of a dividend at the rate of 5 per cent. per annum on all classes of shares, which will leave a balance of £14,750 to carry forward to the next account.

Opposition to the Sutton Water Bill.—The Metropolitan Water Board have decided to petition against the Sutton Water Company's Bill on the following points : (1) Defining the position of the Board and the Company in the parish of Morden ; (2) defining the position of the parishes of Merton and Morden under the provisions of the Metropolis Water Act, 1902, with respect to the deficiency in the water fund ; (3) sterilizing the proposed new capital and works of the Company ; and (4) precluding the Company from opposing on merits, in the event of the Board promoting, within a prescribed period of years, a Bill for acquiring the Company's undertaking otherwise than by agreement.

Barnstaple Gas Company.—The annual meeting of this Company was held on Saturday—Mr. C. E. R. Chanter presiding. The report of the Directors' set forth that the amount standing to the credit of the profit and loss account was £2623 ; and it was proposed to declare a dividend of 5 per cent. on the "A" shares and 3½ per cent. on the "B" shares ; making a total dividend of 10 and 7 per cent. respectively for the year. The Chairman, in moving the adoption of the report, gave details of the income and expenditure, standing respectively at £10,814 and £9156, and said he thought that when the shareholders remembered that residuals had yielded £402 less than last year, the small decrease which had occurred in the revenue account was fairly satisfactory. The increase in the cost of coal and freightage was serious ; but the Company's finances were such that they were justified in paying the full dividends. Gratifying features were that the output of gas had been fully maintained ; 141 consumers had been added, while 91 additional stoves had been put in. He was afraid, however, that unless they could get coal cheaper the Directors would be compelled very reluctantly to raise the price of gas, as other companies had already found it necessary to do. The report was adopted ; and the Chairman, Manager (Mr. F. L. Schofield), and staff were specially thanked for their services during the past year.

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A Vertical Retort Installation for Blyth.

Referring, in their report, to the accounts of the Company for the year ended Dec. 31, the Directors state that the capital account shows an expenditure of £10,306; the Board having, in conjunction with their Consulting Engineer, deemed it necessary to enlarge most of the plant required in the manufacture of gas. They have, in addition, entered into a contract for the erection of an installation of vertical retorts, complete with retort-house, which should be completed in the course of this year, thereby maintaining the works in a state of efficiency. The revenue is £22,937, and the expenditure £18,308, leaving a balance of £4629 as the profit for the year. The balance standing to the credit of profit and loss account is £7253, out of which the Directors recommend the payment of a dividend to Dec. 31 on the ordinary 5 per cent. stock at 7½ per cent. per annum, less income-tax, which will absorb £2232, leaving a balance of £5020. Out of this amount there remains the sum of £748 to transfer to the accounts of both renewal and insurance fund, leaving a net balance of £3524 to the credit of profit and loss account. The interim dividend for the half year ended June 30 having been at the same rate, makes the dividend for the year 7½ per cent., less income-tax—this being the maximum dividend allowed by Statute. The revenue account for the year shows a decrease in receipts as compared with the previous year of £901, and an increase in the expenditure of £359. The increase in the sale of gas continues to make satisfactory progress; the results for the year showing a net increase of £823. Against this, however, coal, labour, &c., cost more, and the results from residual products exhibit a decrease of £1732, owing to the fall in values.

Herne Bay Water Company.—A dividend at the rate of 6 per cent. per annum has been declared upon the ordinary stock of the Company for the half year ended Dec. 31. The accounts adopted at the recent meeting in London showed that the income for the six months (after making provision for empty houses, irrecoverable rates, &c.), amounted to £3065, and the expenditure to £1428.

Gas-Workers' Conditions at Bradford.—The Bradford branch of the Gas Workers' Union have drawn up the following programme, which is to be placed before the members shortly, and, if approved, submitted to the Street and Drainage Committee of the Bradford Corporation: (1) A guaranteed week of 42 hours, with minimum wage of 24s. 6d. per week. (2) For casual workmen, after four months' work, one day's holiday with pay; five months, two days; six months, three days; seven months, four days; eight months, five days; and nine to twelve months, one week. (3) All workmen after ten months' service to be placed on the regular staff, and come under clause 47 of the Insurance Act. (4) Seniority of service to be carried out in each department, private streets, public streets, and sewage workmen with the shortest service to be first discharged during periods of slackness. (5) Only men who are able to show a trade union card to be employed in the department.

Attempted Damage at the Ossett Gas-Works.

In connection with the brief report in last Tuesday's issue of the "JOURNAL" that a deliberate attempt had been made by some person, at present unknown, to wreck the new gas plant at Ossett recently constructed by Messrs. Leech, Goodall, and Co., of Leeds, at a cost of over £20,000, Mr. Harvey Robinson, the Chairman of the Gas Committee, stated at a meeting of the Ossett Town Council last week that the attempt was dastardly, especially when it was considered that in a single hour, the plant, erected at enormous cost, might have been made absolutely worthless, besides injuring and perhaps killing many of the workmen and wrecking the adjoining property. The culprit, if discovered, would be prosecuted with the utmost rigour of the law, and a public service of inestimable value would be rendered by any person who could give information that might lead to the discovery and conviction of the guilty person or persons, who were a danger to the public and hardly fit to be at large. Investigations have been made and show that somebody had put a crowbar in the mechanical coal elevator in such a position as to wreck that part of the machinery when it was set in motion. The valves of the retorts were also found to have been interfered with in such a way that if their positions had not been noticed there would probably have been a terrible explosion which would have destroyed the whole of the works.

West Surrey Water Company.—At the half-yearly meeting of the Company, maximum dividends at the rate of 7 per cent. per annum were declared upon the ordinary £10 shares issued under the Acts of 1877, 1888, and 1901; and a maximum dividend at the rate of 10 per cent. per annum was declared upon the ordinary £10 shares issued under the Act of 1869. The income for the six months ended Dec. 31 amounted, after making provision for empty houses, irrecoverable rates, &c., to £9353, and the expenditure to £3839.

Bourne Gas Undertaking.—At a recent special meeting of the Bourne Gas Company, at which Mr. T. M. Baxter presided (in the absence through indisposition of Alderman W. R. Wherry), a dividend was declared on the ordinary shares at the rate of 8 per cent. for the past year, and it was agreed to pay as compensation £200 to the Secretary (Mr. C. W. Bell), £150 to the Directors, and £75 to the Manager (Mr. H. Bloodworth). It was stated that there was a surplus from last year's accounts, and that after allowing for the payment of the dividend and the compensation agreed to, the amount divisible among the shareholders would exceed £32 per share, the nominal value of which was £15. As to the liquidation, it could not be proceeded with before the money from the sale was actually in the hands of the Company. The undertaking has been sold to the Urban Council; and it has been arranged by that body that the Clerk shall be responsible for the keeping of the necessary books, and collect all money for gas supplied, except from slot-meters, at a remuneration of £80 per annum.

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Llandudno Gas-Works Extensions.—At a special meeting of the Llandudno Urban District Council, it has been decided to proceed with a scheme for the enlargement of the gas undertaking. The matter has been under consideration for some time past, chiefly in regard to the question of whether the new retorts should be of the horizontal or vertical type; and it has now been definitely decided that the former method shall be adopted. A bed of eight through retorts is to be provided, and the existing ones are to be converted into through retorts. The estimated cost of the extensions is £7600; and when the new additions are completed, it is anticipated that the daily production of gas will amount to about 600,000 feet.

Nottinghamshire Water Supply.—There having been many complaints as to the inadequacy, and in some cases the doubtful quality, of the water supply to several South Nottinghamshire villages, a scheme propounded by the Southwell Rural District Council for meeting the wants of Oxton, Epperstone, Lowdham, and Gunthorpe (at a cost of £9000) was investigated at Lowdham last Thursday, by Mr. W. M. Cross a local Government Board Inspector. Mr. H. H. Sands (the Council's Consulting Engineer) estimated that a rate of 8d. in the pound per half year would cover the entire cost of the scheme and working expenses. As to the Nottingham Corporation's alleged obligation to supply the water, this course would be more expensive. There was considerable opposition to the application; it being suggested incidentally that the present was an inopportune time for the expenditure, which it was urged should be deferred till after the war.

Bath Gaslight and Coke Company.—Several "domestic" matters are alluded to in the report that the Directors of the Bath Gas Company have issued in view of the annual meeting to be held to-morrow (Wednesday). They say: "Mr. C. Stafford Ellery, after 35 years' service with the Company, has, on account of failing health, resigned the position of Engineer and Manager, to the great regret of the Directors, who have appointed him Consulting Engineer. Mr. John Wesley Whimster, from the South Suburban Gas Company, of London, has been selected by the Board to succeed Mr. Ellery. A resolution will be submitted to the proprietors at this meeting to increase the salary of the Secretary. Upwards of 50 of the employees of the Company have left for active service in the Army; and the loss of one of them (killed in action) is much regretted. Their places will be kept for them as far as possible; and the Directors have granted allowances to their dependants." The sales of gas were 28 million cubic feet more last year than in 1913—about 4 per cent. increase. The total receipts were £103 843; and the expenditure £87,430. After allowing for the interim dividend of 5 per cent. per annum paid in August and the interest on the debenture stock for the whole of last year, there is a balance on the profit and loss account of £30,068. A 5 per cent. rate of dividend is proposed for the past six months, and will absorb £7572. The Company's paid-up capital (with premiums, including expenses, and the nominal amount added on conversion) is £309,999; and £55,000 has been borrowed. There is a reserve fund of £40,666.

Bovey Tracey Water Supply.—An inquiry was held at Bovey Tracey last Tuesday, by Mr. W. O. E. Meade-King, respecting an application which had been made to the Local Government Board for sanction to a loan of £3100 for the extension of the water supply. Mr. S. C. Chapman, late Engineer to the Torquay Corporation, who has prepared the scheme, explained what it was proposed should be done.

Longwood Gas Company.—The balance of net profit on the working of this Company in the past year was £507; and at the annual meeting on the 25th inst. the Directors will recommend a dividend at the rate of $3\frac{3}{8}$ per cent. on the consolidated ordinary stock—making with the interim dividend $5\frac{1}{8}$ per cent. for the year. The quantity of gas sold was 124,620,900 cubic feet—an increase of 1,611,900 cubic feet, or 1·3 per cent. At the end of the year the Company had gas heating and lighting appliances on hire totalling to 2943, against 2804 the previous year. The number of ordinary meters in use was 3801, and of slot meters 2432. The effect of the war upon the district supplied by the Company had been to create a substantial increase in the demand for gas. The residuals market, however, had been in a state of great depression during the past year. The Bill which was promoted for amalgamating the Longwood and Slaithwaite Gas Companies received the Royal Assent on July 31, 1914, and the amalgamation took effect from Jan. 1 last. In order to obtain the full benefits of amalgamation, it is proposed to erect at Longwood new works capable of manufacturing the whole of the gas required in the combined area.

Gas Show-Rooms at Dewsbury.—At a meeting of the Dewsbury Chamber of Trade last week, a keen discussion took place on the subject of the Dewsbury Corporation Bill, with particular reference to the gas show-rooms which had been established in Northgate. The President (Mr. Harry Senior) expressed the view that the method in vogue at these show-rooms was unfair to local plumbers, and he failed to see any advantage to the Municipality. Mr. W. W. Speight, on the other hand, said he did not think there could be any objection to the present Bill, because the interests of traders were safeguarded by "model" clauses, which were the outcome of the efforts of organized traders; and there had been no such clauses in the Dewsbury Corporation Gas Bill at the time that it had been promoted. He moved a resolution urging the appointment of an Advisory Committeeof the Chamber, to consult with the management of the gas undertaking in order to secure co-operation and enthusiasm in all dealers in gas stoves and appliances, and thereby increase gas consumption, providing that some agreement could be arrived at regarding the Corporation gas show-rooms when the forthcoming removal of the same is to be decided upon. Mr. B. Jackson, in seconding the resolution, thought the plumbers had not sufficiently bestirred themselves in the matter. Councillor Pearson pointed out that the reason for the opening of the show-room had been that at that time the local plumbers did not stock gas stoves. The department had served the town well. Eventually, after a rather heated discussion, the resolution was put to the vote and defeated.

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South Staffordshire Water Company.

In the report to be presented at the annual meeting of this Company on the 25th inst., the Directors state that the number of houses laid on during the year ended the 31st of December was 1094; making the total supplied 144,361. The gross amount of water-rates was £158,882, against £154,428 in the previous year. The Directors have transferred £2000 to the depreciation fund, raising it to £51,621. After providing for interest on debenture stock and dividend on preference stock, the amount remaining on the revenue account (including £7622 brought from last year) is £52,384. Out of this an interim dividend on the ordinary stock, at the rate of 6 per cent. per annum, less income-tax, was paid on the 1st of September last, leaving a net available balance of £32,223; and the Directors recommend the declaration of a final dividend at the rate of 7 per cent. per annum, less income-tax—making a total dividend for the year of 6½ per cent. per annum, less income-tax. The amount of the dividend being £22,686, there will remain £9537 to the good. The Company's Engineer (Mr. H. Ashton Hill, M.Inst.C.E.) reports that the machinery, buildings, and plant are in substantial order and repair. At the close of the ordinary meeting, the Directors will ask the shareholders to authorize the creation of £60,000 of additional capital, and of debenture stock to the amount the Company have the power to borrow in respect of the portion of this capital for the time being raised.

Guarding the Cardiff Gas-Works.

At the meeting of the Cardiff Watch Committee last Wednesday, the Head Constable (Mr. David Williams) presented his annual report. In the course of it he referred to the excellent response which had been made to the appeal to the citizens to enrol themselves as volunteer special constables; 557 of them, representing all professions and callings, having offered their services. He paid a tribute to the zeal and efficiency with which they had discharged the important duties allotted to them. Mr. W. B. Francis said the special constables were guarding, and rightly so, works and premises belonging to companies of a private character. He referred particularly to the gas-works. The gas company produced a commodity necessary for the whole community; and it was perfectly fair that their premises should be protected. But he wanted to know whether the directors, shareholders, and officials—especially the directors—of the Company were taking their part as special constables in guarding not only their own property but also that belonging to the ratepayers. If they were not doing so, he thought the Watch Committee ought to let the directors, shareholders, and officials of the Company know what was expected of them. The Head Constable said he could not say anything about the shareholders; but, roughly speaking, he did not think there were any of the others acting as special constables. Mr. Francis thought it was a shame that, with the huge profits the Company were making, they should look to private citizens to guard the gas-works. The Head Constable said that in 1911 the Company wanted to make their men special constables, on the distinct understanding that they should not be required to protect any property other than that of the Company; and, of course, such a condition could not be entertained now. It was decided to write to the Secretary of the Company on the subject.

Progress at Launceston.—The report presented at the annual meeting of the Launceston Gas Company set forth that, though the profit realized was less than in the previous year, more gas had been made per ton of coal, and the loss of gas had been reduced. The balance of the profit on the revenue account was £569, and £263 had been brought forward. Dr. W. F. Thompson, who presided, remarked that last April they appointed Mr. R. G. Luxon as Manager. He was highly recommended by Mr. Armitage, whose assistant he had been at Ilfracombe; and his appointment had been thoroughly justified by the results achieved. His advice in the purchase of coal had been most useful; and his skill had enabled them to obtain more gas per ton of coal, to reduce waste of it, and increase the production of sulphate of ammonia. The unaccounted-for gas last year was 8·25 per cent., compared with 11·23 per cent. in the previous year; and Mr. Luxon hoped that it might be still further reduced. The decrease in the profit was due to the high price of coal and the reduced price of residuals. The make of gas was 10,600 cubic feet per ton of coal, against 9880 cubic feet the previous year. A dividend of 8 per cent. was declared.

Ilfracombe Gas Company.—In the report presented at the annual meeting of this Company last Tuesday the Directors stated that the balance on the profit and loss account was £2759, after paying an interim dividend of 2½ per cent.; and they recommended the payment of a further 2½ per cent. on the consolidated ordinary stock—making the full statutory dividend for the year. Attention was drawn to the fact that a Bill has been promoted this session with the object of obtaining for the Company increased powers, including a calorific value standard and test. The Chairman (Mr. W. C. Rafarel) remarked that the war had prevented the realization of their anticipation of a year of more than ordinary prosperity. The Company had, however, been able to keep the price of gas at the old figure, and to earn the usual dividend. There had been an increase of about £100 in the cost of manufacture; but management expenses were less by the same amount. The reduction in the price of residuals had affected the revenue to the extent of £350. A contract had been entered into with the District Council for the lighting of the town for eight years from March 25 last. Mr. R. M. Rowe thought the shareholders had every reason for congratulation upon the sound financial and commercial position of the undertaking, and especially upon having a large reserve fund. The fact that there was no mention in the report of an increase in the price of gas was gratifying. The report was adopted and the dividend recommended declared; and the Manager (Mr. J. Armstrong), the Secretary (Mr. A. Norman), and the staff were heartily thanked for their services, which had been increased owing to the absence of some of the Company's employees on service.

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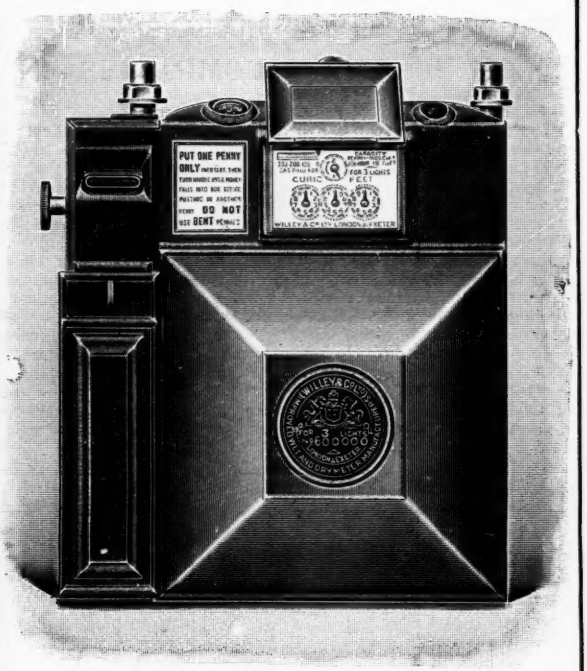

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Electricity Failure in Sheffield.—A sudden failure of the electric light was experienced in a large part of Sheffield on Monday evening of last week. Dense clouds of white smoke were seen issuing from a door at the base of the tower of the Town Hall; and it was found that a transformer had fused. In order to allow the firemen to get to work in the concrete chamber in which the transformer was installed, it was found necessary to cut off the current, which was restored after a lapse of a quarter-of-an-hour.

Increase in Price at Blyth.—The Directors of the Blyth and Cowpen Gas Company announce that, in consequence of the increase in the price of coal and the reduction in the price realized for residual products, the price of gas will be increased to ordinary consumers by 2d. per 1000 cubic feet, making it 2s. 6d., less the usual 5 per cent. discount. For prepayment meter consumers, the basis of payment will remain the same—namely, 3s. 4d. per 1000 cubic feet; but the discount will be reduced from 3d. to 1d. per 1000 cubic feet.

Elland Gas Company.—The annual report of the Elland-cum-Greetland Gas Company states that the profits for the year 1914, including the balance brought from the preceding year, amount to £11,369; and after payment of £3380 in an interim dividend at the rate of 5 per cent. for the June half year on the converted ordinary and new ordinary stock, interest on loan capital, and transfer to reserve fund, &c., there is a balance of £7989 now available for dividend. The Directors recommend payment of a dividend making with the interim distribution 7½ per cent. for the year.

Rossendale Union Gas Company.—The report of the Directors of this Company for the six months ended Dec. 31 last shows a profit of £9387, subject to the half-year's dividend; leaving £4033 to carry to the profit and loss account. The sales of gas for the half year show a decrease of 9·24 per cent. compared with the corresponding period of 1913. The Directors recommend the payment of the statutory dividends, ranging from 10 per cent. on the original shares to 5 per cent. on the new preference shares. The manufacture of gas, &c., cost £9544, and its sale produced £14,059; while residuals yielded £3873.

Water for Licensed Victuallers.—At the last meeting of the Board of Licensed Victuallers' Central Protection Society, it was mentioned that the trade do not accept the view of the Metropolitan Water Board that they are legally entitled to demand to supply licensed victuallers with water by meter; and as the Board have sought to compel the trade to accept this arrangement, the latter's governing body—the Central Board—have, it was reported, succeeded in inducing the Board to agree to a conference on the subject.

Keighley Gas-Works Accounts.—A meeting of the Keighley Town Council was held last Thursday, at which the year's estimates were considered. These pointed to an increase in the rates of 9d. in the pound. A suggestion was made that a rearrangement between the Electricity, Tramways, and Gas Committee would have the effect of reducing the increase to 6d.—the 3d. difference being taken out of the surpluses from these undertakings; but this did not receive the support of the Council. After various of the Committees of the Council had expressed the position in which they stood in regard to their respective undertakings, Mr. John Harrison, on behalf of the Gas Committee, said that the expected decreases in the disposal of residuals from the gas-works on account of the war were no less than £4990; and this figure would be increased to £6026 when account was taken of an additional expenditure of £1036.

The Irish Local Government Board have refused an application by the Athlone Urban Council for a loan of £4000 for the improvement and extension of the water-works.

Ammanford suffered some inconvenience last Saturday week at about half-past eight at night, when the shops and picture palaces were full of people, owing to a failure of the electric lighting, caused by trouble with an engine at the power generating station. Business was brought to a standstill until lamps and candles could be procured. After about half-an-hour's delay, the electric light was restored.

GAS COMPANIES IN THE STOCK EXCHANGE.

The Stock Exchange has had another quiet week; and those who are the chief sufferers from the reduction of business continue to point to the unreasonably high minimum prices of some securities, the practical effect of which is to exclude them from the market altogether. The tone was variable—favourable in some lines, and the reverse in others. Railways were not strong; and the predominant opinion was that the terms of the compact made with the Government upon the outbreak of war were rather too much to their disadvantage. On the other hand, undertakings connected with the production of munitions and warlike material were cheerful and lively. In the gas industry, meetings of many of the leading companies have been held in the week. The reports and accounts presented have given general satisfaction when due allowance is made for the conditions under which the companies have been working for the last six months, and the dividend results have in most cases exceeded expectation. But a feeling of indignation was provoked by the attitude of the Government in regard to promoting the provision of facilities for getting coal to the works. Surely, the public lighting should not be jeopardized.

Business in gas securities was rather quiet; but prices generally were firm. The bargains done for cash during the week were as follows: On Monday, Brighton and Hove ordinary 145, 145½, Cape Town preference 3½, Gas Light maximum 73, 73⅝. On Tuesday, Brighton and Hove ordinary 145, 145½, 146, Commercial 4 per cent. 100½, Gas Light ordinary 93, 93⅛, 93¾, ditto debenture, 71, 71½, Melbourne, 99½, 99⅝, 99⅞. On Wednesday, Bombay 5¼, Commercial 4 per cent. 99⅝, European 13¼, Gas Light ordinary, 93, 93⅛, ditto maximum 72, 72½, Primitiva preference 98s., South Metropolitan 100, 100½. On Thursday, Alliance and Dublin 66, Commercial 4 per cent. 97½ *ex div.*, Gas Light ordinary 91, 91¼, 91⅛ *ex div.*, Imperial Continental 81, Primitiva preference 4⅜, 4 7/16, 4⅜, 4 9/16. On Friday, Bournemouth preference 13 3/16, Cape Town preference 3½, Gas Light ordinary 91⅛, 91½, 92, ditto maximum 70½ *ex div.*, ditto preference 90½, 91 *ex div.* Primitiva debenture (1911) 84, South Suburban West Kent 92½. On Saturday, Gas Light ordinary 91¼, 92, Imperial Continental 83, 83½, South Metropolitan 97 *ex div.* The Money Market was unchanged.

Bank rate (fixed Aug. 8) 5 per cent.; last year, 3 per cent.

LOWEST AND HIGHEST PRICES OF BARGAINS DONE FOR CASH IN THE WEEK ENDING FEBRUARY 13.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices. July 30.	Yield on Highest Closing Price.	Lowest and Highest Prices of Bargains.
£			p.c.			£ s. d.	
1,551,868	Stk.	April 8	2½	Alliance & Dublin Ord.	59 –64	3 18 2	66
374,000	,,	July 10	4	Do. 4 p.c. Deb.	76–79	5 1 3	..
280,000	5	April 29	7½	Bombay, Ltd. . . .	5¼–6⅜	5 17 8	5¼
50,000	10	Feb. 26	16	Bourne- 10 p.c. . .	29 –30	5 6 8	..
378,480	10	,,	7	mouth Gas B 7 p.c. .	15–15½	4 10 4	1½–14⅜
95,000	10	,,	6	and Water Pref. 6 p.c.	13½–14	4 5 9	1¼
—	—	—	—	Deb. . .	..	—	93–93½
880,000	Stk.	Feb. 26	14	Brentford Consolidated	261–266	5 5 3	..
330,000	,,	,,	11	Do. New . . .	204–209	5 5 3	..
50,000	,,	,,	5	Do. 5 p.c. Pref. .	109 –111	4 10 1	..
206,250	,,	June 11	4	Do. 4 p.c. Deb. .	91–93	4 6 0	..
217,380	Stk.	Feb. 26	11	Brighton & Hove Orig.	208–213	5 3 4	
244,200	,,	,,	8	Do. A Ord. Stk. .	154–159	5 0 8	145—146
530,000	20	Mar. 26	12½	British	44–45	5 11 1	42–42¼
120,000	Stk.	June 26	4	Do. 4 p.c. Deb. Stk.	88–93	4 8 11	..
245,771	Stk.	June 26	4	Buenos Ayres 4 p.c. Deb.	85 –87	4 12 0	..
100,000	10	—	—	Cape Town & Dis., Ltd.	1½–2½	—	..
100,000	10	—	—	Do. 4½ p.c. Pref. .	4 –6	—	3½
100,000	Stk.	June 26	4½	Do. 4½ p.c. Deb. Stk.	70 –75	6 0 0	..
157,150	Stk.	Feb. 26	5	Chester 5 p.c. Ord. . .	108–110	4 10 11	
1,513,280	Stk.	Feb. 12	5/9/4	Commercial 4 p.c. Stk.	106–108	5 1 2	97½x
560,000	,,	,,	5½	Do. 3½ p.c. do. .	103 –105	5 1 6	98
475,000	,,	June 11	3	Do. 3 p.c. Deb. Stk.	69½–71½	4 3 11	..
800 000	Stk.	,,	4	Continental Union, Ltd.	76 –79	5 1 3	70½–71
200 000	,,	,,	7	Do. 7 p.c. Pref.	115–118	5 18 8	..
—	—	—	—	Croydon C 7 p.c., . .	..	—	215—216
492,270	Stk.	—	6	Derby Con. Stk. . . .	123–125	4 16 0	..
55,000	,,	—	4	Do. Deb. Stk. .	102–104	3 16 11	
1,002,180	10	July 29	10	European, Ltd. . . .	17½–18*	5 11 1	18½
16,362,910	Stk.	Feb. 12	1/17/4	Gas 4 p.c. Ord. . .	98–102	4 15 6	91–92x
2,600,000	,,	,,	3½	Light 3½ p.c. max. .	76–79	4 8 7	70½x
4,062,235	,,	,,	4	and 4 p.c. Con. Pref.	96–99	4 0 10	90½–91x
4,674,850	,,	June 11	3	Coke 3 p.c. Con. Deb.	72½–74½	4 0 6	71–71½
258,740	Stk.	Mar. 12	5	Hastings & St. L. 3½ p.c.	87–89	5 12 4	8⅛–89½
70,000	10	April 29	11	Hongkong & China, Ltd.	16½–16¾	6 11 4	..
—	—	—	—	Hornsey 7 p.c. . . .	..	—	160
131,000	Stk.	Mar. 12	7½†	Ilford A and C . . .	151–154	5 2 4	..
65,780	,,	,,	6⅔†	Do. B	115–118	5 8 0	..
65,500	,,	June 26	4	Do. 4 p.c. Deb. . .	92–94	4 5 1	..
4,940,000	Stk.	May 14	9	Imperial Continental .	150–160	5 12 6	81—83
1,235,000	Stk.	Feb. 12	8½	Do. 3½ p.c. Deb. Red.	84–86	4 1 5	..
200,242	Stk.	Mar. 12	6½	Lea Bridge Ord. 5 p.c. .	119–121	5 7 5	..
561,000	Stk.	Feb. 26	10	Liverpool United A .	211–213	4 18 11	..
718,100	,,	,,	7	Do. B .	146–148	4 14 7	..
926,083		June 26	4	Do. Deb. Stk.	97 –99	4 0 10	..

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices. July 30.	Yield on Highest Closing Price.	Lowest and Highest Prices of Bargains.
£			p.c.			£ s. d	
75,000	5	June 11	0	Malta & Mediterranean	4⅛–4⅝	6 9 9	..
250,000	100	April 1	4½	Met. of Melbourne 4½ p.c. Deb.	99 –101	4 9 1	99½–99⅝
541,920	20	May 28	4	Monte Video, Ltd. . .	11½–12	6 13 4	..
1,775,892	Stk.	July 29	4½	Newc'tle&G'tesh'd Con.	98½–99½	4 10 6	..
529,705	Stk.	June 26	3½	Do. 3½ p.c. Deb.	82 –83	4 4 10	..
55,940	10	Feb. 26	7/14.0	North Middlesex 7 p.c.	14–15	5 2 8	
300 000	Stk.	May 14	8	Oriental, Ltd. . . .	117 –122	6 11 2	117
60,000	5	Mar. 26	10	Ottoman, Ltd. . . .	7½–7⅝	6 9 0	..
60,000	50	Feb. 26	13	Portsea, Island B . .	128–131	4 19 3	..
100,000	50	,,	12	Do. C . .	118–121	4 19 2	
249,980	5	April 29	8	Primitiva Ord. . . .	5⅛–6	6 13 4	4⅞–5 1/16
499,960	5	June 26	5	,, 5 p.c. Pref. .	4⅜–5	5 0 0	4⅛–4 5/16
521,600	100	June 2	4	,, 4 p.c. Deb. .	91–93	4 6 0	85½–86
—	—	—	—	,, ,, 1911	..	—	84
346,198	Stk.	June 26	4	River Plate 4 p.c. Deb.	85–87	4 12 0	85
150,000	10	May 14	6	San Paulo 6 p.c. Pref.	10½–11	5 9 1	..
125,000	50	July 1	5	5 p.c. Deb.	47–49	5 2 0	..
135,000	Stk.	Mar. 12	10	Sheffield A	223–224	4 9 3	..
209,984	,,	,,	10	Do. B	222–224	4 9 3	..
523,500	,,	,,	10	Do. C	220–222	4 10 1	..
90,000	10	May 28	9	South African . . .	10½–11½	7 16 6	..
6,429,895	Stk.	Feb. 12	5/9/4	South Met., 4 p.c. Ord.	111–113	4 16 8	97x
1,895,445	,,	July 10	3	Do. 3 p.c. Deb.	72½–74½	4 0 6	70½–71½
209,820	Stk.	Feb. 26	8½	South Shields Con. Stk.	157–159	5 6 11	..
952,795	Stk.	Feb. 26	6	S'th Suburb'n Ord. 5 p.c.	114–116	5 3 5	108
60,000	,,	,,	5	Do. 5 p.c. Pref. .	110–112	4 9 3	..
—	—	—	—	Do. West Kent. .	..	—	92½
137,058	,,	June 26	5	Do. 5 p.c. Deb. Stk.	116–118	4 4 9	107½
629,740	Stk.	May 14	5	Southampton Ord. . .	99 –102	4 18 0	..
120,000	Stk.	Feb. 12	7½†	Tottenham A 5 p.c. .	135–138	5 8 8	..
742,275	,,	,,	6†	District B 3½ p.c. .	115–117	5 2 7	112
181,255	,,	June 26	4	4 p.c. Deb.	87–89	4 9 11	..
182,380	10	Dec. 30	5	Tuscan, Ltd.	5–6	8 6 8	..
149,900	10	July 1	5	Do. 5 p.c. Deb. Red.	93–95	5 5 3	..
236,476	Stk.	Mar. 12	5	Tynemouth, 5 p.c. max.	108½–109½	4 11 4	..
				Wandsworth, Wimbledon, and Epsom—			
30,000	Stk.	Feb. 26	8⅜	Wandsworth A 5 p.c.	151–156	5 7 4	..
255,636	,,	,,	6⅜	,, B 3½ p.c.	129–134	5 2 7	..
108,075	,,	,,	5/17/8	,, C 3½ p.c.	110–115	5 2 0	..
352,000	,,	,,	6⅛	Wimbledon 5 p.c. .	117–122	5 0 5	..
98,000	,,	,,	6⅜	Epsom 5 p.c. . . .	121–126	5 5 2	..
88,416	,,	June 26	3	3 p.c. Deb. Stk. . .	66–69	4 6 11	..

x Bargains marked thus were "Ex Div."

Under the title of Arthur Lyon and Wrench, Limited, a company has been formed with a capital of £12,000, in £1 shares, to carry on business as electro-mechanical engineers and manufacturers of lamps, light-projecting apparatus, and lighting sets.

The Finance and General Purposes Committee of the Bradford Corporation have decided, after consideration of the City Treasurer's financial statement on the result of the operation of the Workmen's Compensation Insurance Fund for the three years ended March 31, 1914, by the Special Insurance Sub-Committee, that, in view of the large percentage of the sums claimed as compared with premium income of the Gas Department, among others, the premium be increased from 12s. per cent. to 20s. per cent. for the years ending March 31, 1915, and March 31, 1916.

The Richmond Gas Stove and Meter Company held their half-yearly conference of representatives and heads of departments at the Warrington works on the 4th and 5th inst, Mr. H. M. Thornton presiding. Many important developments proposed by the Company were explained and discussed; and during the conference a presentation was made to Mr. W. H. Tickell, the cashier of the Company, on his completing 25 years' service. Mr. S. P. Thornton, who joined the Army last year, was able to be present for a short time, and received a hearty welcome from his colleagues.

APPLICATIONS FOR LETTERS PATENT.

1570.—Roberts, A., "Heating coke-ovens." Feb. 1.
1573.—Shannon, J., and Simpson, W. M., "Bunsen burners." Feb. 1.
1630.—Mellor, W., "Acetylene generator." Feb. 2.
1700.—Ordish, F. W., and Robert Dempster and Sons, Limited, "Screening and conveying coke." Feb. 3.
1714.—Fabry, R., "Compressing air and gases." Feb. 3.
1733.—Richmond Gas Stove and Meter Company, Limited, and Hartley, H., "Measuring or ascertaining radiant energy." Feb. 3.
1738.—Grove, H. E., and Barker, F. G., "Tiles for regenerator chambers." Feb. 3.
1763.—Stephenson, A., and Whibley, R. J. M'L., "Controlling the discharge of fluids under pressure." Feb. 3.
1816.—Booty, P. C. P., "Air-gas irons." Feb. 4.
1919.—Peet, W. W., "Registering the opening or closing of cocks and valves." Feb. 6.
1927.—Glover, T., "Apparatus for regulating temperatures." Feb. 6.
1944.—Hale, S. H., "Gas-mixer." Feb. 6.

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments, &c., Vacant.

Gas Engineer and Manager. Blackburn Corporation. Applications by Feb. 25.
Engineer-Representative (Telpherage, &c.). J. W. Broadhead (Robert Dempster and Sons), Elland.
Chemist. No. 5995.
Draughtsman. West's Gas Improvement Company, Manchester.
Draughtsman. C. & W. Walker, Donnington.
Junior Assistant (Laboratory). No. 5994.
Meter Repairer (to Take Charge). No. 5996.

Gas-Works Wanted.

Particulars to "Principal," Scripps's Advertising Offices, 13, South Molton Street.

Plant, &c. (Second-Hand), for Sale.

Exhauster. Wrexham Gas Company.

Pupils.

100 Million Works. No. 5992.
400 Million Works. No. 5993.

Manufacturer Wanted.

Gas-Cooker. Williman and Turner, West Norwood.

Chemical Business for Disposal.

Kelvinside Chemical Company. Particulars of, and Tenders to, S. Easton Simmers, 21, West Nile Street, and A. A. Todd, 168, Buchanan Street, Glasgow.

Sales of Stocks and Shares.

Aldershot Gas, Water, and District Lighting Company. London Mart. March 9.
Brentwood Gas Company. London Mart. Feb. 23.
Falmouth Water Company. London Mart. Feb. 23.
Felixstowe and Walton Water Company. London Mart. March 9.
Herts and Essex Water Company. London Mart. Feb. 23.
Reading Gas Company. Tenders by March 9.
Southend Water Company. London Mart. March 9.

Meetings.

Harrow and Stanmore Gas Company. Holborn Restaurant. March 1. One o'clock.
Sittingbourne Gas Company. 1a, Crescent Street, Sittingbourne. Feb. 25. Twelve o'clock.

TENDERS FOR

Carbonizing Plant and Buildings.

St. Annes-on-the-Sea Gas Company. Tenders by March 10.

Fire-Clay Goods.

Loughborough Gas Department.

Gasholder (Repairs).

Salford Gas Department. Tenders by March 4.

Ironwork for Underground Tank.

Sheffield Gaslight Company. Tenders by March 2

Oil for Gas Making.

Edinburgh and Leith Gas Commissioners. Tenders by Feb. 22.

Pipes, &c.

Plymouth Corporation. Tenders by March 9.

Stoking Machinery and Coal Elevating Plant.

St. Annes-on-the-Sea Gas Company. Tenders by March 10.

Tank (Excavation and Construction).

Sheffield Gaslight Company. Tenders by March 2

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

Wanted, For Sale, and Tender Advertisements, Six Lines and under, 3s.; each additional Line, 6d.

TERMS OF SUBSCRIPTION to the "JOURNAL."

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All Communications, Remittances, &c., to be addressed to Walter King, 11, Bolt Court, Fleet Street, London, E.C.

Telegrams: "GASKING, FLEET LONDON." Telephone: Holborn 6857.

OXIDE OF IRON.

O'NEILL'S OXIDE
For GAS PURIFICATION.
LARGEST SALE OF ANY OXIDE.

SPENT OXIDE PURCHASED IN ANY DISTRICT.

GAS PURIFICATION & CHEMICAL CO., LD.,
Palmerston House,
Old Broad Street, London, E.C.

"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for GAS-WORKS.
Andrew Stephenson, 171, Palmerston House, Old Broad Street, London, E.C. "Volcanism, London."

D. ANDERSON AND COMPANY,
GAS LIGHTING ENGINEERS AND CONTRACTORS.
18 & 20, FARRINGDON ROAD, LONDON, E.C.
Telegrams: "Dacolight London." Telephone: 2336 Holborn.

J. E. C. LORD, Ship Canal Tar-Works, Weaste, Manchester. Pitch, Creosote, Benzols, Toluol, Naphtha, Pyridine, all kinds of Cresylic Acid, Carbolic Acid, Sulphate of Ammonia, &c.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, Oldham, and 45 & 47, Westminster Bridge Road, London, S.E.
WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS AND GOVERNORS.
Repairs receive prompt attention.
Telephones: 815 Oldham, and 2412 Hop, London.
Telegrams—
"Braddock, Oldham," and "Metrique, Lamb London."

BENZOL
AND
CARBURINE FOR GAS ENRICHING
ALSO
THE MAXIM PATENT CARBURETTOR.
For Prices, &c., apply to
THE GAS LIGHTING IMPROVEMENT CO., LTD,
SALISBURY HOUSE, LONDON WALL, E.C.
Telephones: 4452 and 4453 London Wall.
Telegraphic Address: "Carburine, London."

SPENCER'S PATENT HURDLE GRIDS.

THE very best Patent Grids for Holding Oxide Lightly.
See Illustrated Advertisement, p. 364.

OXIDE OF IRON.
We are in a position to Supply Oxide of Iron promptly, and invite Enquiries.
SPENT OXIDE WANTED.
BALE & CHURCH, LTD.
5, Crooked Lane, London, E.C.

"TORTO" FIRE CEMENT.
BALE & CHURCH, LTD.
5, Crooked Lane, London, E.C

"KLEENOFF," THE COOKER CLEANSER.
Tins for sale to Consumers.
In Bulk for Works Use.
BALE & CHURCH, LTD.
5, Crooked Lane, London, E.C.

TAR AND GAS LIQUOR WANTED
IN LONDON DISTRICT.

THOMAS CLAYTON (Oldbury) Ltd.,
BRENTFORD, W.
Telegrams: Canal Brentford. 'Phone: Ealing 17.

ROBERT DEMPSTER & SONS, Ltd., Contractors for Complete CARBONIZING PLANTS and every Description of GAS APPARATUS, ELEVATING, CONVEYING, and TELPHERAGE PLANTS, also STOKING MACHINERY, ROSE MOUNT IRONWORKS, ELLAND.

R. & G. HISLOP,

GAS ENGINEERS, RETORT BUILDERS, CONTRACTORS, &c.

RETORT SETTINGS, COAL TESTING PLANT BOILER FIRING.

Communications should be addressed to UNDERWOOD HOUSE, PAISLEY.

SULPHURIC ACID.

SPECIALLY prepared for Sulphate of AMMONIA Makers by

CHANCE AND HUNT, LIMITED.

Works: OLDBURY, WEDNESBURY, AND STAFFORD.

Address Correspondence and Inquiries to OLDBURY WORCS.

Telegrams; "CHEMICALS, OLDBURY."

SULPHURIC ACID.

SPECIALLY prepared for the manu- facture of SULPHATE OF AMMONIA.

SPENCER CHAPMAN & MESSEL, LTD., with which is amalgamated WM. PEARCE & SONS, LTD., 6, Mark Lane, LONDON, E.C. Works: SILVERTOWN.

Telegrams: "HYDROCHLORIC, FEN, LONDON."

Telephone: 1588 AVENUE (3 lines).

TAR WANTED.

JOSEPH A. HUTCHISON, LIMITED, HIGHBRIDGE WHARF, SOMERSET.

TAR WANTED.

THOMAS HORROCKS & SONS, LTD.,

Albert Chemical Works,

NORTON STREET, MILES PLATTING, MANCHESTER.

Pitch, Creosote, Brick and Fuel Oils, Benzol, Solvent Naphtha, Carbolic, Lysol, Sulphate of Ammonia.

AMMONIA Waste Liquor Disposal. Purification Plant. Results Guaranteed. No Working Costs. JOHN RADCLIFFE AND CO., Chemists and Engineers, Palace Chambers, WESTMINSTER, S.W.

PATENTS AND TRADE MARKS PUBLICATIONS: "MERCHANDISE MARKS ACT, and Decisions thereunder," 1s.; "TRADE SECRETS v. PATENTS," 6d.; "DOCTRINE of EQUIVALENTS, Mechanical and Chemical," 6d.; "SUBJECT-MATTER of PATENTS," 6d.

MEWBURN, ELLIS, & PRYOR, Chartered Patent Agents, 70 & 72, Chancery Lane, London, W.C. Telegrams: "Patent London." Telephone: No. 243 Holborn.

TAR WANTED.

THE Burnden Tar Company (Bolton), Ld. HULTON CHEMICAL WORKS, BOLTON.

GAS PLANT for Sale—We can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.

FIRTH BLAKELEY, SONS, AND COMPANY, LIMITED, Church Fenton, near LEEDS.

SULPHATE OF AMMONIA SATURATORS and all LEAD and TIMBER WORK in Connection with Sulphate Plants.

We Guarantee promptness with efficiency for Repairs.

JOSEPH TAYLOR AND CO., CENTRAL PLUMBING WORKS, BOLTON.

Telegrams: "SATURATORS BOLTON." Telephone 0848.

GAS-WORKS requiring Extensions should Communicate with FIRTH BLAKELEY, SONS, AND CO., LIMITED, Dewsbury, who make a Speciality of Catering for the Smaller Gas Concerns. Prices Reasonable; quality and results, the best. Satisfaction Guaranteed.

"GAZINE" (Registered in England and Abroad). A radical Solvent and Preventative of Naphthalene Deposits, and for the Automatic Cleaning of Mains and Services.

It is also used for the Enrichment of Gas.

Manufactured and Supplied by C. BOURNE, West Moor Chemical Works, KILLINGWORTH, or through his Agents, F. J. NICOL & Co., Pilgrim House, NEWCASTLE-ON-TYNE.

Telegrams; "DORIC," Newcastle-on-Tyne. National Telephone No. 2497.

WANTED—Gentleman to Represent the Telpherage and Conveying Department of Robert Dempster and Sons, Limited, Engineers, Elland. Must have good Electrical Knowledge, and be Conversant with the Subject. None but First-Class Engineers need apply.

State Age, Salary required, and Experience, to Mr. J. W. BROADHEAD, care of Robert Dempster and Sons, Limited, Rosemount Iron-Works, ELLAND.

COUNTY BOROUGH OF BLACKBURN.

APPOINTMENT OF GAS ENGINEER AND MANAGER.

THE Corporation of Blackburn invite APPLICATIONS for the Position of GAS ENGINEER AND MANAGER.

The Salary will be £800 per Annum.

Candidates must not exceed the age of 45 Years.

The Gentleman appointed will be required to Devote the Whole of his Time to his Duties and will not be allowed to engage in Private Practice.

Canvassing, either directly or indirectly, will be regarded as a Disqualification.

Original Testimonials must not be sent, and if sent will not be returned.

Applications, Stating Age, Qualifications, and Experience, accompanied by *copies* of not more than three recent Testimonials and endorsed "Gas Engineer," to be sent to the undersigned not later than Twelve o'clock at noon on Thursday, the 25th inst.

By order,
LEWIS BEARD,
Town Clerk.

Town Hall, Blackburn,
Feb. 8, 1915.

WANTED—Competent Draughtsman for Constructional Steel-work, with knowledge of Gas-Works Plant.

Applications, which must be marked "Private," and State Age, Experience, and Salary required, to C. & W. WALKER, LIMITED, Donnington, NEWPORT, Shropshire.

DRAUGHTSMAN wanted, Mechanical and Structural Experience.

Apply, giving all Particulars, with Age and Salary required, to WEST'S GAS IMPROVEMENT COMPANY, LIMITED, Albion Iron-Works, Miles Platting, MANCHESTER.

GAS Engineer and Manager, 100 Mil- lion Works in Midlands, has a VACANCY FOR A PUPIL.

Address No. 5992, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C.

THE Engineer and Manager of an Important Gas Undertaking in the Midlands has a VACANCY FOR AN ARTICLED PUPIL with Good knowledge of Chemistry. Make of Gas, 400 Millions per Annum.

Address, No. 5993, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C.

JUNIOR Assistant wanted for Labo- ratory of Manufacturing Concern. Experience in Tar Products Desirable.

Apply, by letter, stating Age, Experience, and Salary required, to No. 5994, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C.

WANTED—Experienced Gas-Works CHEMIST well up in Gas Manufacture, for 50-Million Works. Good prospect for Capable Man.

Applications, which will be treated in confidence, stating Age, Experience, and Salary required, to No. 5995, care of Mr. KING, 11, Bolt Court FLEET STREET, E.C.

METER REPAIRER.

WANTED—a Thoroughly Experi- enced Man, capable of Taking Entire Charge of Small Repair Shop, for Gas Company in the South

Apply, by letter, giving full Particulars of Experience, present Occupation, Age, and Wages required to No. 5996, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C.

ADVERTISER is prepared to Pay a Commission to anyone Introducing a SMALL GAS-WORKS that can be PURCHASED for Cash, where there is Scope for Development.

Particulars in Confidence, or write for interview to "PRINCIPAL," Scripps's Advertising Offices, 18, SOUTH MOLTON STREET, W.

WREXHAM GAS COMPANY.

GAS-Exhauster for Sale.—One Two- Blade Steam Driven GAS-EXHAUSTER, by the Bryan Donkin Company. Capacity, 20,000 Cubic Feet per Hour; being replaced by one of larger size. Can be seen working during the next few weeks.

Apply to the MANAGER, Gas-Works, WREXHAM.

PLYMOUTH CORPORATION WATER-WORKS.

CAST-IRON PIPES.

TENDERS are invited for the Supply and Delivery of about 750 Yards of 12-inch, 600 Yards of 6-inch, and 600 Yards of 4-inch CAST-IRON PIPES.

Specification and Form of Tender and other Information may be obtained at this Office on and after Monday, the 22nd of February, 1915.

The lowest or any Tender will not necessarily be accepted.

Tenders, enclosed in envelopes provided, to be Delivered at this Office by Twelve o'clock noon on Tuesday, the 9th of March, 1915.

FRANK HOWARTH, M.Inst.C.E.,
Water Engineer.

Old Guildhall, Plymouth,
Feb. 13, 1915.

LOUGHBOROUGH CORPORATION.

(GAS DEPARTMENT.)

RENEWAL OF RETORTS.

TENDERS are invited by the Gas Committee for the RENEWAL OF RETORTS.

Further Particulars may be obtained from
EDWARD ONIONS,
Engineer and Manager.

Gas-Works, Loughborough.

COUNTY BOROUGH OF SALFORD.

(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for REPAIRS to a Four-Lift GASHOLDER, 150 feet Diameter, at their Regent Road Works.

The Drawings may be seen, and *copies* of the Specification and Form of Tender obtained, on Application to Mr. William W. Woodward, Engineer, Gas Offices, Bloom Street, Salford.

Sealed Tenders, endorsed "Tender for Repairs to Gasholder," to be Delivered to me not later than 3 p.m. on Thursday, the 4th of March, 1915.

L. C. EVANS,
Town Clerk.

ST. ANNES-ON-THE-SEA GAS COMPANY.

TO CARBONIZING PLANT CONTRACTORS.

THE Directors of the above Company invite TENDERS for the Erection of a STEEL-FRAMED RETORT-HOUSE, COAL-STORE, and RETORT-BENCH; also Electrically-Driven STOKING MACHINERY and COAL ELEVATING PLANT.

The Plans may be Inspected, and Copies of the Specification and General Conditions Obtained, on Application to Messrs. Isaac Carr and Son, Widnes.

The Site and Copies of Plans may be Inspected on Application to the Manager of the Gas-Works, St. Annes-on-the-Sea.

Sealed Tenders, endorsed "Retorts," must be addressed to the Chairman, W. J. Porritt, J.P., and Delivered to the undersigned not later than the 10th day of March, 1915.

The lowest or any Tender will not necessarily be accepted.

WILLIAM H. NUTTER,
Secretary and General Manager.

St. Annes-on-the-Sea, Feb. 13, 1915.

TO BUILDERS AND CONTRACTORS.

THE Directors of the Sheffield United Gas Light Company invite TENDERS for the EXCAVATION and CONSTRUCTION of a CONCRETE TAR and LIQUOR TANK, 141 ft. 6 in. long by 58 ft. 6 in. wide by 24 ft. deep, at their Grimesthorpe Station.

Drawings may be seen, and Specification with Bill of Quantities obtained, upon Application to the Engineer, Mr. J. W. Morrison, M.Inst.C.E., at the Company's Offices, Commercial Street, Sheffield.

The Directors do not bind themselves to accept the lowest or any Tender.

Sealed Tenders, endorsed "Tender for Tar and Liquor Tank," must be Delivered by post to Mr. Hanbury Thomas, Managing-Director, not later than the first post on Tuesday, March 2, 1915.

W. HAMBY,
Secretary.

Commercial Street,
Sheffield, Feb. 11, 1915.

TO ENGINEERS AND IRONFOUNDERS.

THE Directers of the Sheffield United Gas Light Company invite TENDERS for the Supply and Delivery of about 140 Tons of CAST-IRON GIRDERS and COLUMNS, &c., forming part of an Underground Tar and Liquor Tank at their Grimesthorpe Station.

Drawing may be seen, and Specification with Bill of Quantities obtained, upon Application to the Engineer, Mr. J. W. Morrison, M.Inst.C.E., at the Company's Offices, Commercial Street, Sheffield.

The Directors do not bind themselves to accept the lowest or any Tender.

Sealed Tenders, endorsed "Tender for Ironwork," must be Delivered by post to Mr. Hanbury Thomas, Managing-Director, not later than the first post on Tuesday, March 2, 1915.

W. HAMBY,
Secretary.

Commercial Street,
Sheffield, Feb. 11, 1915.

EDINBURGH AND LEITH CORPORATION'S GAS COMMISSIONERS.

THE Commissioners are prepared to Consider TENDERS for the Supply of about 1000 Tons of OIL suitable for Gas Making Purposes, to be Delivered in Railway Tank-Waggons at the Commission's Sidings, Granton Works, Caledonian and North British Railways, or *vid* Granton Harbour. Delivery to be at the rate of 100 Tons Weekly, commencing the 15th of March, 1915.

Full Particulars may be obtained on Application to the Engineer and Manager, Mr. Alexander Masterton, 15, Calton Hill, Edinburgh.

Sealed Tenders, marked "Tender for Gas Oil," to be addressed to the undersigned on or before Monday, the 22nd of February, 1915, at 10 a.m.

JAMES M'G. JACK,
Clerk.

25, Waterloo Place,
Edinburgh, Feb. 10, 1915.

GAS-COOKER, Patent No. 9546— Wanted a Firm of Engineers to MANUFACTURE THE ABOVE.

All Communications should be addressed to WILLIAMAN and TURNER, WEST NORWOOD. Telephone, Streatham 325.